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Frontline workers in education, health and welfare: how much do they earn in European countries?

A comparative income analysis based on the EU-LFS

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Abstract

The present paper analyses frontline workers' incomes in the fields of education, health, and welfare ("EHW"). In the face of an upsurge in demand for such services, the question is how EHW occupations can attract enough qualified workers, now and in the future. In public perception, EHW work is poorly paid, while empirically, wage heterogeneity between occupations is quite large. A comprehensive comparison of EHW occupations' wages across Europe is still lacking. The present contribution seeks to fill this gap by comparing incomes for 24 European countries, based on data from the European Union's labour force survey (EU-LFS) between 2016 and 2020. Our descriptive analysis yields that EHW workers earn slightly above-average incomes in the majority of countries. This result can be explained by the high share of EHW workers with a tertiary education level. By contrast, for EHW workers with only secondary education, we find that they earn less in EHW than in other labour-market segments. Both outside and inside the EHW, we observe higher incomes for men than for women. Between EHW occupations, there is an income hierarchy led by medical doctors and tertiary education teachers. At the lower end, there are personal care workers with lower formal education who earn below-average incomes in all observed countries. Yet the degree to which they are penalised differs widely. From a dynamic perspective, our findings hint at a slightly deteriorating relative income position of EHW workers in the 2010s, apparently caused less by declining wages than by structural change in the wider labour market.

Keywords: income, Europe, public goods, service work, care work, inequality

Zusammenfassung

In diesem Working Paper werden Einkommen von Beschäftigten in den Bereichen Bildung, Gesundheit und Soziales („EHW") analysiert. Angesichts der steigenden Nachfrage nach solchen Dienstleistungen stellt sich die Frage, wie EHW-Berufe jetzt und in Zukunft genügend qualifizierte Arbeitskräfte anziehen können. In der öffentlichen Wahrnehmung ist Arbeit in diesen Bereichen schlecht bezahlt, während empirisch eher Lohnheterogenität beobachtbar ist. Ein umfassender Vergleich der Löhne von EHW-Berufen in ganz Europa steht noch aus. Der vorliegende Beitrag untersucht auf Basis der Arbeitskräfteerhebung der Europäischen Union (EU-AKE) Einkommen in 24 europäischen Ländern in den Jahren 2016 bis 2020. Es zeigt sich, dass EHW-Beschäftigte in der Mehrzahl dieser Länder leicht überdurchschnittliche Einkommen erzielen. Dies lässt sich durch den hohen Anteil von EHW-Beschäftigten mit einem tertiären Bildungsniveau erklären. Im Gegensatz dazu stellen wir fest, dass EHW-Beschäftigte, die nur über einen Sekundarschulabschluss verfügen, in den Bereichen Bildung, Gesundheit und Soziales weniger verdienen als anderswo. Sowohl außerhalb als auch innerhalb dieser Bereiche beobachten wir höhere Einkommen für Männer als für Frauen. Zwischen EHW-Berufen gibt es eine Einkommenshierarchie, die von Ärzten und Hochschullehrern angeführt wird. Am unteren Ende befinden sich Pflegekräfte mit wenig formaler Qualifikation, die in allen beobachteten Ländern unterdurchschnittliche Einkommen erzielen. Das Ausmaß der Benachteiligung ist jedoch sehr unterschiedlich. Unsere Ergebnisse deuten ferner darauf hin, dass sich die relative Einkommensposition von EHW-Beschäftigten in den 2010er Jahren leicht verschlechtert hat, was offenbar weniger auf sinkende Löhne als auf strukturelle Veränderungen im Arbeitsmarkt insgesamt zurückzuführen ist.

Keywords: Einkommen, Europa, Daseinsvorsorge, Dienstleistungsarbeit, Sorgearbeit, Ungleichheit

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1 Introduction

The present paper reports on frontline workers' incomes in the fields of **e**ducation, **h**ealth, and **w**elfare ("EHW", cp. EIGE 2017, 80) in Europe. They can also be referred to as "care workers" (England, Budig, and Folbre 2002, 455) in a wider sense of the term, as they "provide a face-to-face service that develops the human capabilities of the recipients" (ibid.). This direct interaction with the client qualifies these workers as "frontliners". In the context of demographic change and of multiple further challenges to the provision of necessary services (like the Coronavirus pandemic and refugee streams induced by armed conflicts, economic hardship, and climate change), the question is whether and how such occupations can attract enough (qualified) workers. Research shows that monetary income does not solely determine job attractiveness in the eyes of workers, in particular in person-oriented and public utility services (Auffenberg et al. 2022; Connelly 2013; Borzaga and Tortia 2006). EHW labour supply might thus be less "wage elastic" than in other sectors. However, employers and society should not exploit this. Moreover, most workers need to make a living from their work, which can be difficult with a low-qualified job, especially in urban areas.

In public perception, work for the "common good" tends to be underpaid. Yet research has long shown wide differences among different EHW occupations' wages (Barron and West 2013, 118), even within the same branch, like in the case of medical doctors and assistant nurses. There is an increasing number of empirical publications on care workers' earnings in individual countries, in particular since the discussion upsurge during the Coronavirus pandemic. There are also some cross-national comparisons of care workers' incomes, but they usually either do not include many European countries, or do not single out a large selection of care occupations. As all European countries are concerned with (skilled) labour shortages in EHW—and may even compete for internationally-mobile workers—it would be interesting to find out what income positions these countries assign to EHW occupations. Are nurses, for example, paid as much in Germany as they are in other countries?

The present contribution seeks to explore this by comparing the income positions of full-time employees working in EWH occupations across 24 European countries in the years from 2012 to 2020. The study is based on data from the European Union's labour force survey (EU-LFS). At a methodological level, it will address and overcome shortcomings of the survey's income information: The particular construction of the item INCDECIL may be the reason why the EU-LFS is not often used for income analysis in spite of its advantages, in particular the rich sample size.

What makes frontline work in education, health and welfare so societally relevant?

The GenDis project, in the context of which this analysis is performed, addresses the topic of (possible) labour shortages in critical domains.[1] EHW frontliners are exemplary because, first, they are generally acknowledged as delivering societally necessary services, and second, these services are of a person-oriented nature (Lehwess-Litzmann et al. 2020).

The notion of *societally necessary services* implies that some kinds of work and some parts of the economy have a particular importance for society. This idea has a place even in neoclassical economic

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[1] GenDis is funded by the German Federal Ministry for of Education and Research (BMBF) under contract number 01UG1915A. Read more on the project's website http://www.sofi-goettingen.de/projekte/gesellschaftlich-notwendige-dienstleistungen-sicherstellen-ist-arbeit-am-gemeinwohl-attraktiv-gendis/

thinking, which otherwise tends to refrain from normative judgements regarding production and distribution. Yet the concept of "meritoric goods" (Musgrave 1956) has been introduced for goods that governments provide or even impose to correct consumers' choices in cases where this choice is judged as either uninformed or deformed by externalities. Discussions about the necessary goods and services are ongoing in various contexts, for example, in the fight against poverty, the assurance of equivalent living conditions within and across countries, the critical debate on the privatisation of public infrastructures, and recently in connection with the transition towards an environmentally sustainable future way of living. In all these contexts, the topic of what is essential for human well-being inevitably gets on the agenda. There is a growing literature on "basic human needs" (Wiggins 1998), "capabilities" (Sen 2000), "public goods" (Vogel 2020),[2] the "foundational economy" (Foundational Economy Collective 2019), and "societally necessary services" (Hilbert, Bienzeisler, and Becka 2013; Bonin et al. 2018). While differences are in the selection of goods and services that authors suggest focussing on, due to differing purposes and contexts, there are also important overlaps. EHW activities are regularly part of the suggested domains.[3]

The *person-orientation* of some services has particular implications for labour demand. The production of many societally necessary services is, and will probably always remain, labour intensive. One reason is that clients are individual cases that require highly non-standardised services. Another reason is that clients are not passive recipients of services but are usually required to co-produce. This co-production already begins with the definition or negotiation of the goal of the service intervention, but it goes all along the process, e.g. when a pupil learns from a teacher, or when a client performs exercises under the supervision of a physical therapist. Often, a successful service provision also requires a social and emotional process in which the professional and the client engage with each other: Trust and mutual understanding have to be built up. For example, a good personal relationship between pupils and teachers has been identified as a key for successful schooling. The provision of many services is thus deeply *interactive*, which precludes standardisation or substitution of human labour by machines. At least there are obstacles to rationalisation by way of automation or the use of artificial intelligence, not least of which are ethical limits.

The combination of the societal necessity and the irreducibility of human labour makes the service domains we focus on an important labour-market topic. Both aspects together substantiate a continuous need for a sufficient number of adequately qualified workers "at the frontline" of service provision, as the services in question can neither be cut down nor can the workers' productivity be significantly raised. We thus look at monetary rewards as one important aspect of occupations' attractiveness, which co-decides the sufficient and adequate provision of societally necessary services now and in the future.

Overview of the paper

The chapter following this introduction will present the state of knowledge on wage determinants in EHW occupations. The selected occupational groups share features that can explain wage similarity, but (compositional) differences also can explain wage divergence between EHW occupations.

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[2] "Public goods" understood in a normative sense: goods and services which nobody should be excluded from and which should be available in a certain quantity and quality even if many persons consume them.

[3] We do not mean to contest the necessity of occupations other than EHW. What is perceived as necessary changes in the function of societal needs.

In preparing our own empirical analysis, chapter 3 presents the data and method we will use. It introduces the EU-LFS and explains the dataset's strengths and weaknesses. The dataset's critical weakness is the kind of income information provided: Instead of exact amounts, we only get the income decile of each employee. We explain how we can use this information to determine relative income positions of occupational groups, which are unbiased by structural labour-market differences between countries.

Chapter 4 contains our empirical analysis. We first compare incomes of EHW workers as one single group to incomes earned by employees in general. We then show how the relative income positions of EHW workers differ between the 24 countries observed, and how they differ among the 13 selected occupational groups within the EHW field. We also look at compositional differences between these groups, with regard to personal features, work contracts and employers. Most of our observations are based on pooled data from the five years from 2016 to 2020. In order to find out about income developments over time, we contrast these more recent findings with income levels from the years 2012 to 2015. Our final step of empirical analysis is to sort the 24 countries into groups, according to the income structures of EHW occupations.

The concluding chapter 5 presents an overview of the study's results, discusses its limitations and looks out to further work. The main limitation is that the analysis in this paper is purely descriptive, dedicated to occupational groups' income levels "as they are". Such an approach is simple but valid. We look at the real income levels of real persons. Yet questions on the *causes* of wage premiums and penalties would have to be answered by different methods, e.g. multivariate analysis.

2 State of knowledge: determinants of wages in EHW occupations

Monetary rewards to occupations are a topic of longstanding discussion in sociology and economics. Treiman (1977) found positions in social hierarchies to be tied to occupations in all societies globally. Overall, inequality is, to an important part, formed by income differences between occupations (Haupt and Ebner 2020), even though there is also intra-occupational wage inequality. Furthermore, as different as societies are, Treiman found the rank order of occupational groups in terms of earnings to be similar across societies (what Hout and DiPrete 2006 call the "Treiman constant").[4] This does not mean, however, that each specific occupation is remunerated identically in all countries and at all times. There are many factors that can make an occupation better-paid in country A than in country B, or better-paid in country A today than some years ago. Therefore, in this chapter, we will discuss the main reasons why monetary rewards for EHW work can differ between occupations, across countries and over time.

In the context of a labour market, the interaction of *supply and demand* is necessarily a key part of the answer (Oesch and Rodríguez Menés 2011). If something is scarce, markets will attribute a high price. In that case, employers try to attract sought-after members of the workforce by offering comparatively high wages and jobseekers (and maybe even jobholders) monitor wages advertised in job offers. Labour demand is influenced by technological, demographic, cultural, or also political developments. Labour offer is mainly determined by demographics, the work preferences of persons in working age, and labour-market policies, which can be more or less commodifying.

However, the labour market is not a pure market where supply and demand interact freely. Weber's theory of *social closure* describes situations where "the competition for a livelihood creates groups interested in reducing that competition" (Weeden 2002, 58). For example, occupational groups can try to ration the supply of their kind of labour and foster demand for the goods and services produce by themselves (instead of others). Also, trade unions, in the context of collective bargaining, derive their negotiating power from the threat of curtailing labour supply. In turn, labour demand varies according to whether and how specific needs in society are met. In the case of social services, a basic choice is whether to buy them as services or to produce them in the household for one's own use. The *State* intervenes at many instances in the interplay of supply and demand: as a *regulator* of markets for labour and for goods and services, as a *provider* of services, and as a (co-)*financier*. The State, thus, has a large impact on the supply and demand for EHW services, which underlines their political dimension.

In the first section of this chapter, we will discuss factors that predominantly shape the demand side of EHW services and labour (2.1) and the second section will be dedicated to the supply side (2.2). The third section addresses factors that condition the interaction of supply or demand and intervene in the wage setting process (2.3).

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4 A sociological explanation for this phenomenon has been offered by functional structural theory: some occupations are particularly important for societies' well-functioning. These occupations usually involve handling complex technologies, which requires highly skilled workers. In order to make the most able and gifted persons train for and choose those occupations, they need to be rewarded particularly well in terms of income and prestige. In economics, human capital theory offers a similar explanation (Weeden 2002, 71); the prospect of higher salaries is necessary to convince persons to additionally invest in education. However, society is not necessarily organized in the ideal way that functional structural theory would assume, and future occupational rewards are not clear at the time (young) people make their educational investments.

The aim and scope of this chapter is limited in two ways: first, it will, like the paper as a whole, focus on EHW and on aspects that are mainly important to this field. A more global overview of factors informing the complex link between occupations and wage differences can be found in Haupt and Ebner (2020). Among the many factors that can be relevant, we will concentrate here on those that should impact either wages in EHW occupations as a whole, or which could explain wage differentials between the particular occupational groups we observe. The second limitation concerns empirical differences between countries. Both the balance between demand and supply and the process of wage setting can differ between national labour markets. We will not be able to cover the technological, demographic, cultural, and institutional differences of the 24 countries included in our empirical analysis. The chapter has the modest aim of addressing and sorting the factors that can potentially explain the empirical income differences observed in chapter 4.

2.1   The demand for EHW labour and services

As the demand for labour impacts on wages, the number of services consumed and the way of providing them will play a role in occupations' monetary rewards. We will in the following look at broad technological, demographic, and cultural trends and discuss their relevance for labour demand in EHW. We will also look specifically at the welfare state as financier and employer.

2.1.1   Technological change, skills and tasks

Frontliners in EHW activities occupy jobs of various complexity, demanding skills ranging from assistant care worker without training or work experience to medical doctor with university studies and many years of professional experience. Regarding task content, tasks in education have a strong cognitive component, while care work can also be quite manual. Yet all EHW frontliners fulfil communicative tasks, as they have to work together closely with clients. The fact of doing interpersonal work, be it cognitive, manual, or communicative, makes EHW work predominantly non-routine work. This is important for wages because of differing trends of rewards to different types of labour in recent years. There are two competing, or also complementary, theories:

One is the theory of *skill-biased technological change* (SBTC). It posits that "technology is biased in favour of skilled workers and against unskilled workers" (Goos and Manning 2007; see also Card and DiNardo 2002, 20). The idea is that while technology replaces the labour of unskilled and mid-skilled workers, it enhances the productivity of the skilled. For example, information and communication technologies (ICT) can be used by workers in high-skilled jobs, eliminating the need for secretaries. SBTC can also occur within occupations, tilting the mixture of tasks typically performed in favour of more complex tasks, leading to "occupational upgrading" (ibid., 119; see also Eurofound 2017a, 37). SBTC theory thus predicts a shrinking number of low-skilled workers and a growing number of high-skilled workers. Ceteris paribus, this would entail a decline of wages in low-skilled jobs compared to higher-skilled jobs because there is an excess supply of low-skilled and shortage of high-skilled workers. SBTC could explain low/declining wages of assistant occupations and high/rising wages of professionals in our sample of occupational groups. Yet Haupt and Ebner (2020, 28) find SBCT empirical evidence rather weak: returns to cognitive skills depend on economic conditions, and it is not clear how important specific skills really are for wages. Goos and Manning (2007, 132) characterise SBTC as a "partial truth".

A second theory is called *routine-biased technological change* (RBTC). Its tenet is that ICT substitutes not necessarily low-skilled workers, but workers "carrying out a limited and well-defined set of cognitive and manual activities, those that can be accomplished by following explicit rules (what we term 'routine tasks')" (Autor, Levy, and Murnane 2003, 1280; Autor 2015) while complementing "workers in carrying out problem-solving and complex communication activities ("non-routine" tasks)" (ibid.) Interestingly, it is the middle-skilled jobs that typically involve a high degree of routine tasks (e.g. bookkeeping). Unlike SBTC, RBTC theory does not predict a decline of low-skilled jobs, but rather of middle-skilled jobs. The relationship between routine and skill seems to be an unsettled question; however, Fernández-Macías, Hurley, and Arranz-Muñoz (2017a, 43) find empirically that "routine tasks and skill level are very strongly correlated". If that is true, SBTC and RBTC basically predict the same development in the labour market.

What follows from the skill- and the routine-based explanations of labour-market change for the (trends of) remuneration of EHW occupations? First, EHW work never consists exclusively of routine tasks because communicative processes between persons are impossible to standardise. Accordingly, EHW occupations are counted among those with the lowest potential to be substituted (Dengler and Matthes 2021; Kreimer, Brudna, and Eibinger 2021), which should prevent declining wages. If person-oriented service jobs represent a growing share of the labour market, as it would follow from RTBC theory, their relative income position should go up, either because other kinds of work face declining wages, or to make EHW jobs attract more workers (cp. Bárány and Siegel 2018). Second, EHW work is often skilled. Across countries and with few exceptions, "care workers are more educated and more likely to be professionals than non-care workers" (Budig and Misra 2010, 447). That does not preclude, however, important skill differences between different EHW occupations. Wages in EHW should not be the lowest in general, but also divergent. And they should tend to rise over time according to SBTC, especially if skilled workers become increasingly scarce. Yet technology does not have a place as central in EHW as it does in other domains: EHW work often consists of live communication between persons (e.g. in a teaching situation) or includes manual tasks (e.g. in nursing practice). It is an open question how much technological change will transform EHW work in the future and substantiate pay rises for highly skilled workers as SBTC theory suggests.

2.1.2 Demographic and cultural change

The labour market for EHW activities evolves according to societal needs and the way they are met. In recent decades, an educational expansion in European societies has required a growth in teaching staff. A good part of this demand for tertiary education came from women, who wanted to train for a career. In the context of soaring female employment, there has also been a tremendous growth of professional child care outside of the home, making child care workers a fast-growing group. The upsurge in female employment created more (female) employment because all the needs formerly covered by informal work are now catered to in the formal economy: dual-career households have less time to process the goods they purchase for internal use than the traditional bread-winner household, and they have less capacity to produce services for their own use. This situation changes the structure of goods and services bought by households, and with it the structure of the labour market (Dwyer 2013; Bartelheimer and Wittemann 2003).[5]

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[5] The most prominent example are day-care centres with infants who would until recently have been cared for by their mothers up. Usually, women work in day-care centres as assistant or professional childcare workers. Their care service

Also in health care and social work, employment grew in recent decades. The increasing life expectancy led to a growing share of elderly people in the population who consume more health and care services than the young. This change sparked an increase in the number of doctors, nurses, and staff in elderly care. A growing variety of possible (medical) treatments have also contributed to higher demand in that sector. Finally, in the domain of welfare, States have stepped up their efforts to solve social problems and have assumed new responsibilities, which has increased the number of social workers. Regarding pay, the sustained increase in required labour in all EHW domains should have created and should continue to exert an upward pressure on EHW occupations' wages.

2.1.3 The State as provider and (co-)financier

Unlike many services of everyday consumption, services in EHW are usually not based on simple market transactions between two parties. The service provider is not chosen and paid out of pocket by the consumer, instead the State is involved as a (partial) financier or even offers the service directly. One reason is that while person-oriented services are labour intensive and therefore expensive, they are also existentially needed, also by persons without much private buying power. Health care for the elderly, almost by definition, addresses clients without current income from work; and in the context of welfare services, the direct beneficiaries are often poor households. Another reason is that EHW services are often beneficial not only to the person consuming them, but also to society as a whole (England, Budig, and Folbre 2002, 469; cp. also Budig, Hodges, and England 2019, 299). Economic theory classically describes this as "positive externalities". On the one hand, they are a blessing, but on the other hand, they make that the direct beneficiaries of services do not spend as much as would be optimal for society, so subsidies are needed to raise service provision up to a level which is preferable by all different stakeholders. An example is social work, in which a family in distress can benefit from counselling services, but the neighbourhood will also benefit (and society as a whole, even in the far future).[6] For these reasons, the public finances or co-finances EHW services in European countries, though at varying extents (there are different "worlds of welfare", see below).

Any State has to limit expenses at some point. A prominent scholar who has addressed the problem of strained public budgets is W.J. Baumol. In his works from the 1960s and 70s, he theorized the so-called "cost disease", which follows from the stagnant productivity of interpersonal services together with the need to compete for workers with other, more dynamic sectors (Baumol and Oates 1972). For example, even if a teacher cannot teach more pupils in the year 2022 than in 1972, his remuneration will need to grow comparatively to the wage gains in industrial production over the last 50 years; otherwise, the relative attractiveness of the teaching job would have declined. In order to still motivate a sufficient number of workers for teaching—this is the core of Baumol's idea—the welfare state would have to face rising wage cost in the education branch in spite of stagnant productivity. One can critically discuss

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is different from private care in many ways, not only due to specialised training of staff, but also the number of children in the institution and the division of labour between members of staff and with the parents (who still remain responsible for many aspects of child care). Yet professional day-care remains the functional equivalent for care formerly delivered in private households. A similar thing can be observed in elderly care.

[6] This is why some EHW services are examples of "meritoric goods" (see above). Another example is children's schooling, which pays off for the economy and for democratic society mostly in the far future. Not every household can or would afford the educational expenses that the State disburses for every child.

aspects of this theory,[7] but the diagnosis and prediction has proven relevant over the last decades (Baumol et al. 2012). Public expenditure has risen (Pierson 2011) and welfare states have been looking for strategies of cost reduction.

One of these strategies can be to ration service provision, i.e. to lower the availability and the quality of services. This is part of so-called "austerity policies" (Mueller 2018), which affect clients and service professionals alike. Another strategy that concerns all workers (but indirectly also clients) is governance and organisational changes. In recent years, public service providers were reformed—at least to some degree— along the lines of "new public management" (Hood 1991), making them more similar to private sector organisations. Part of service provision was also shifted from public to private providers (Mueller 2018, 8). Apart from effects on labour, like increased work pressure, service workers can be affected in terms of more insecure career paths (fewer civil servants and a proliferation of fixed-term contracts) and wages also become more variable. Budig et al. (2019, 299) highlight that public service employees, those who work directly for the State, benefit from wage floors (especially if the occupation is low paid), but also face wage ceilings (especially the well-remunerated echelons).

Broad trends like austerity, governance reforms, and privatisation need to be put into the perspective of persistent international welfare state heterogeneity. Different types of welfare states (Esping-Andersen 1990)—liberal like in the United Kingdom, redistributive/social democratic like in Scandinavia, layered/corporatist like in Germany, or residual/familialistic like in Italy—have been identified. Similarly, some scholars also speak about "care regimes" (Lightman 2021, 971 et seq.), a notion that makes the reliance of national care solutions on "invisible" labour a topic, be it the labour of migrants (ibid.) or of women (Leitner 2009).[8] Regimes are consequences of past political choices, so path dependency as well as cultural preferences make them persist over time.

Regime differences could be a source of wage heterogeneity between EHW occupations across countries. As Eurofound stated in a report on EU countries, "the state accounts directly or indirectly for between 15% and 35% of employment. In sectors such as health, education and public administration, policy decisions – whether to reduce or expand public expenditure on such services – have a very direct bearing on the shape of overall employment shifts" (Eurofound 2017a, 12). Hipp and Kelle (2016, 260) empirically check whether government social expenditure is correlated with the incomes of education and health care service workers across European countries. They find that incomes of professionals in health and care services do not vary systematically with expenditure. For workers in education and for assistant staff in health care services, however, such a (bivariate) link can be confirmed.

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[7] Is productivity really entirely stagnant in all person-oriented services, even in the presence of ground-breaking ICT innovations? Do service sectors really have to keep up with wage increases in industry, given the importance of non-monetary motivations of workers and the specificity of skills which hamper transitions between branches? Will coming generations of workers not be automatically channeled to service jobs, given that automation shrinks the number of job openings in the industrial, dynamic sectors of the economy?

[8] Scholars have also discussed different roads that countries can take on their way to becoming service economies (Häußermann and Siebel 1995; see also Scharpf 1986).

2.2 EHW labour supply

Some major changes in labour supply have occurred in recent decades. The labour force features growing shares of older workers, immigrants, women, and higher-educated workers (Eurofound and JRC 2021, 9; Eurofound 2017a, 13; Goos and Manning 2007, 126) and an increasing share work in part-time. While the overall supply affects the labour market in general, the supply specifically for EHW occupations depends, beyond this, on the ability and inclination of working-aged persons to train for these occupations and pursue a career in them. We will address, in this context, gender and public service motivation as possible drivers of occupational choice. However, not everybody motivated for a specific kind of work can freely exercise it. Some EHW activities are usually the privilege of specific occupations, either reserved for them by law (licensure) or by employers' hiring conventions (credentialism). Beyond that, collective bargaining can also restrict labour supply, and the State's labour market regulation defines under which conditions labour can be bought and sold in a country.

2.2.1 Ageing and immigration

A rising life expectancy and smaller birth cohorts at the bottom of the age distribution led to an *ageing* of the European population (Eurofound and JRC 2021, 6). It was already mentioned that this change increases the demand for health and care services. Yet another consequence is an ageing of the workforce itself, and a growing scarcity of workers relative to the population beyond working age. While labour supply has grown for years in many countries, it has recently begun to shrink (Eurofound 2017a, 5), as the "baby-boomer" generation is beginning to enter retirement and fewer young people are replacing them in the labour market. This change is not specific to EHW.[9] What is specific is that labour shortages must not be allowed to lead to rationing like it would be possible in other branches. EHW services are societally necessary, so solutions will have to be found to ensure them. This can lead to rising work pressure, but it can also bring wage increases to attract more workers. The remaining EHW workers' improved negotiating position could also lead to higher wages in the future.

A contingent factor that could offset demographic ageing to some extent is *migration*. Europe has welcomed successive waves of immigration from varying regions. This influx strengthens the supply of workers, young persons in particular, often with either low levels of formal education or tertiary educational certificates. For the latter, the qualification acquired in the country of origin cannot necessarily be put to use in the host country, either because of a real lack of matching between qualifications and jobs, or because of institutional barriers (2.2.4). Therefore, many migrants, also with high education levels, work in low-paid jobs in their host countries. Immigration would therefore raise labour supply in particular for occupations that require little qualification (Lightman 2019; Simonazzi 2009). In the EHW field, this would be especially personal care work; immigration could slow down wage growth there. (However, the prospective rise in demand for personal care services will probably surpass the potential gain of migrant labour by far.) Medical doctors and university professors also come from abroad relatively often. As for medical doctors, there is a particular scarcity of professionals, e.g. in Germany. This scarcity leads to efforts to recruit staff abroad and also from non-European countries, even

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[9] There can be particular shortages, like in Germany, where the public service has not hired many new workers for some time and is now confronted with a particular drain from retirement (DGB 2019, 26).

though formal permission to exercise this occupation has to be acquired.[10] As for university staff, academia's international standards make entry from abroad relatively easy.

2.2.2 Women in care work

Some trends in labour supply originate in changing preferences in the working age population. As already mentioned above, *women* have increasingly been taking part in formal economic activity in recent decades, starting earlier in Northern and Eastern Europe, later in Western and finally in Southern European countries. Female labour-market participation raises labour supply as a whole, but in particular in EHW segments of the labour market, which is due to the fact that men and women still tend to opt for different types of work (Eurofound and JRC 2021). EHW occupations are particularly often exercised by women: 69% of teaching professionals, 70% of health professionals, 80% of health associate professionals, and 90% of personal care workers in Europe are female (EIGE 2017, 19 on the period 2013–2014; cp. also Eurofound 2017b, 26). A few occupations like "nursing and midwifery" are even almost exclusively exercised by women in some countries (Mueller 2018).

Women's preference for EHW occupations can be explained by several factors. One factor is work-life balance. As the brunt of informal work in the household remains on women's shoulders, many women look for jobs with a good work-life balance, e.g. part-time and without much overtime work.[11] Some occupations are more suitable for part-time workers than others (Haupt and Ebner 2020, 33). EHW jobs are often part-time jobs due to work organisation requirements, which has to adapt to the timing of tasks over the day. These jobs can even be in part-time against workers' preferences, serving as a buffer for unforeseeable peaks (e.g. in case of illness of colleagues). Part-timers often suffer a wage penalty; high earnings remain connected to frequent overtime work (ibid.).[12]

Another reason for women's frequent choice of EHW occupations has to do with gendered "occupational images". The psychologist Linda Gottfredson (1981) famously postulated that individuals have stereotype images for occupations regarding gender, status, and tasks. These images are gained in the course of primary socialization, by way of influences from family and friends, teachers, and the media. In consecutive phases of personal development, individuals develop a concept of themselves, with an orientation to sex roles emerging aged 6 to 8 years. According to Gottfredson's theory, persons self-select into occupations based on the acquired occupational stereotypes and on their self-concept, seeking a good fit between how they view the occupation and how they view themselves. EHW occupations are often chosen by women due to their connation as female work (Huppatz 2010). This occupational choice conforms not only to the (acquired) self-concept as women, but also to the gendered expectations of the social environment. It is therefore a way of gaining positive feedback, both at the moment of choosing the occupation and later in life.[13] A gendered occupational choice could also be due to the actual or perceived own abilities, which can differ between women and men. As a consequence, a growth of female

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[10] https://www.make-it-in-germany.com/de/arbeiten-in-deutschland/gefragte-berufe/aerzte, last accessed 2022-10-21.

[11] This is, of course, just a tendency. Not all women live with children in their households, and some women have male partners who participate fully in domestic chores. Also, there are households that employ domestic workers as a support.

[12] That being said, some men also work part-time, either for household reasons or for more self-fulfilment in private activities (including engagement in honorary posts).

[13] In the same vein, the theory of "impression management" states that women tend to choose care occupations in order to emphasize their belonging to the female gender even independently of their own actual professional interests and abilities (just like men might choose occupations with a technical content for that reason) (Matthes 2019, 72 et seqq.).

employment participation means, in particular, a larger labour offer to EHW segments of the labour market. This "results in an oversupply of typical female occupations, which lowers the wages in these occupations" (Haupt and Ebner 2020, 34).

A gender pay gap—the phenomenon that women earn less than men, even for the same kind of work—can result from several mechanisms, including a motherhood penalty, hiring discrimination, a bargaining effect, and a glass ceiling effect (Eurofound and JRC 2021, 7; see also Petrongolo and Ronchi 2020). While the extent of the gender pay gap is a matter of debate (and depends on exactly what is compared), the gender pay gap's existence is well-established empirically (Eurofound and JRC 2021, 12 et seqq.). Its size differs between countries as well as the degree by which observable factors can explain it (Boll et al. 2016; Landmesser 2019). The gendered choice of occupation is one element of the explanation. As regards care occupations, Hirsch and Manzella (2015, 266) showed that for the United States, the predominantly female composition explains part of the wage penalty of care occupations, though not a very large part.[14] For health and elderly care workers and for skilled nurses and midwives in European countries, Mueller (2018, 5) reports that "the higher the proportion of women in the sector, the lower the average relative income" (ibid., 5, cp. also 16).

2.2.3 Workers' aspirations: helping others and doing qualified work

Research has shown that persons with a strong "*public service motivation*" (PSM) (Perry and Wise 1990) are more inclined than others to choose EHW occupations (Houston 2000; 2005). Several dimensions of PSM have been identified. According to Perry (1996, 20), they include attraction to public policy making, commitment to the public interest, compassion, and self-sacrifice. It should be in particular the latter two dimensions that can motivate for care work (the former two being relevant rather for jobs in administrative or security functions of public service). The labour supply for EHW occupations should thus depend on the propensity of workers to look for these kinds of intrinsic rewards in their work, and on EHW occupations' reputation and ability to satisfy this wish.

An intrinsic reward for exercising a certain type of work (e.g. due to PSM) should be connected to lower earnings according to the *theory of equalizing differences* (Rosen 1986). This theory postulates that wage differences between occupations are partly explained by their differing non-monetary advantages or disadvantages. Just like particularly hard, unpleasant, or dangerous work should be associated with higher pay, subjectively fulfilling work should thus be paid less. If persons are drawn to EHW occupations because they can help others in these professional roles, this should lower their reservation wages. Empirically, there is only little evidence that hardship and hazard connected to occupations determine wages (Eurofound 2017a, 37), and even on the contrary, "between-job wage differentials tend to be positively correlated with job quality: jobs with bad working conditions tend to also have lower wages and vice versa" (ibid., 41 et seq.). We are not aware of an empirical test of the theory especially for care work. Lightman and Kevins (2019) detect a "care work-job satisfaction bonus", particularly for less-skilled care workers. However, Budig et al. (2019, 296) note that care work is not necessarily attractive for everybody,

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[14] It was also shown (for the US) that the gender pay gap can even negatively affect men working in female-dominated labour-market segments. Yet positive wage implications of being part of a male minority in a female-dominated occupation have also been shown. This so-called "glass escalator" effect stems from gender stereotypes existing even within female-dominated domains and of men choosing more-technical tasks within these domains (Dill, Price-Glynn, and Rakovski 2016).

and some may even avoid it and find fulfilment in other kinds of work, which would offset the described effect.

In the context of workers' aspirations, we should also mention once again the longstanding trend of *educational expansion* (Oesch and Rodríguez Menés 2011, 506 et seq.), leading to an increasing share of highly qualified workers in the labour market. This outcome should in principle depress monetary compensation for highly qualified work and improve wages for low-qualified work (as fewer people want to do it). Yet educational expansion is mirrored by occupational upgrading (Oesch 2013), which can be due to a rise in the complexity of task, ICT use, and the necessity of abstract knowledge and analytical skills (see above: SBTC). Alternatively, it can be driven by the larger offer of highly educated workers itself. Occupational upgrading can also be due to strategies of raising the perceived attractiveness of a given occupation for highly qualified workers.[15] If jobs become more complex or are recognised as increasingly complex it can justify a rise in wages.

2.2.4 Occupational closure

In modern economies, a host of different tasks are performed in the production of a large variety of goods and services. The division of labour, even though very pronounced, does not mean that each worker continuously performs only one specific task. Rather, each job usually involves a set of different tasks. The way tasks are bundled together is similar across organisations, and such a typical combination of tasks is called an "occupation".[16] Occupations are institutions that facilitate the matching between workers and employers (Damelang, Stops, and Abraham 2018, 413 et seq.), and that connect the system of education and training to the labour market (ibid., 410). Occupations are "social constructs" (Haupt and Ebner 2020, 21): they could be cut differently, but they need to be efficient in fulfilling the mentioned functions.

Occupations constitute groups of persons in the labour market who share common interests and expectations, concerning the way they work and social status and monetary rewards (Damelang, Stops, and Abraham 2018, 410). These interests and expectations can be enforced by a monopoly that an occupational group holds on the ability to perform specific tasks for others (Weeden 2002). The more the tasks are perceived as important and the better the monopoly can be defended against other providers, the better the position of that occupational group in society. A legitimation is product quality (including safety): members of an occupational group may have undergone specialised training, gathered professional experience, share an occupational ethos, and know and follow appropriate rules when performing their tasks. A counter-argument against occupational monopolies, from a liberal or also egalitarian point of view, is that they enforce "social closure" (Max Weber).[17] In a labour market context, we can speak of *occupational closure* (Damelang, Stops, and Abraham 2018, 408), which is to the detriment of all non-members of an occupational group. Other workers who might want to provide the

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[15] In countries with a heritage of vocational education, occupational upgrading can bring about turning formerly non-academic EHW occupations into academic ones. For example, Germany was one of the last countries in Europe to make midwifery an occupation for which new entrants need tertiary education, as of 2021. Other mid-skilled occupations still strive to become academic disciplines.

[16] Alternatively, an occupation could also be defined as a "typical set of skills (Haupt and Ebner 2020, 23).

[17] Social closure "occurs wherever the competition for a livelihood creates groups interested in reducing that competition. These groups try to monopolize advantages and maximize their rewards by closing off opportunities to outsiders they define as inferior or ineligible" (Weeden 2002, 58).

product in question and gain income from that activity, and customers and clients, who have to accept higher prices or confront a rationed offer.

An occupational group can achieve closure by various means. Weeden (2002) distinguishes three main devices which can restrict the supply of labour: educational credentialing, licensure, and unionization.[18]

Educational credentialing depends on the possession of "familiar symbols or markers of knowledge (e.g., grade levels, diplomas) conferred by formal educational institutions" (ibid., 61). Firms and organisations require these credentials or at least consider them in their hiring decisions. They are not obliged to do so, but it reduces their training cost (Christoph, Matthes, and Ebner 2020, 66). This employer hiring practice can even be at their own disadvantage, as closed occupation-specific labour markets are created (Haupt and Ebner 2020, 31) and characterised by wage premiums. Credentials, to be meaningful, presuppose a certain degree of standardisation of skills (Damelang, Stops, and Abraham 2018, 409 et seqq.). An example would be teaching occupations: one can usually not become a maths teacher without having studied this subject at university.[19]

Licensure "requires that individuals obtain permission from the state in order to identify themselves by an occupational title (e.g., psychologist) and, in many cases, practice a particular set of skills (e.g., counselling)." (Weeden 2002, 62) The allocation of a licence can depend upon possessing an educational credential. But unlike credentialing, which is an informal practice, licensure is based on legal, enforceable norms. For example, exercising a medical doctor's work without a licence would be criminal in many countries. Budig et al. (2019, 299) distinguish high-licencing and low-licencing occupations, with the former requiring "regular renewal of licenses in order to continue employment."

Unionization is associated with "state-sanctioned collective bargaining and the threat of the withdrawal of labor" (Weeden 2002, 63). One example for a strongly unionized EHW occupation is, again, teachers. Usually, unions are organised around industries not occupations (ibid., 64). Other than by unions, occupations can be organised in the form of occupational boards or associations (the former having legally binding powers). However, in these cases, the restriction of the labour supply is not the main strategy by which occupational groups defend their interests, but they refer, e.g. to lobbying or advertisements.

The more successful occupational groups are in reducing competition, the higher the rewards that they can generate for themselves (Weeden 2002, 60). In particular, "the more closed an occupational labor market is, the higher are the average wages of the employees inside this market" (Haupt and Ebner 2020, 31). As these rewards are not completely backed by performance on the job, occupational closure can be termed a strategy of "rent seeking". Besides raising average wage levels, occupational closure also has the effect of compressing intra-occupational wage differences (Haupt 2012).

In the EHW field, like in the labour market as a whole, occupational groups possess unequal power to enforce occupational closure. Often, this power is connected to qualification, as credentialing always is, and licencing is often, based on educational certificates. The examples mentioned, teachers and medical doctors are highly qualified groups. However, low-qualified (care) occupations can also be licenced (cp.

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[18] Beyond restricting supply, occupational groups can also try to raise demand and to channel it to their members (Weeden 2002, 57 and 66). For example, there can be disputes on which occupational group has the competency to perform a specific medical treatment.

[19] Yet the exact content of the curriculum is not necessarily standardised (cp. Vicari 2014); different maths teachers may have learned different things during their studies.

Budig, Hodges, and England 2019, 299), if specialised training and/or examinations are prescribed to ensure high service quality, like in the case of emergency medical assistants or cosmetologists (ibid.). Other low-qualified occupations, like assistant positions in education and elderly care, may not be credentialed, licenced, or unionized. The tasks they perform are not necessarily simple tasks, as they can involve complicated social interactions, but the necessary skills are considered as commonplace. The nearby absence of barriers to entry means that workers are hardly shielded against competition and thus incur low incomes.

The state of occupational closure varies between countries (Eurofound 2017a, 38). Occupations in general do not play the same role in all labour markets. Occupational regulation is one aspect of coordinated market economies (Hall and Soskice 2001), as opposed to liberal market economies. In the latter, training inside of firms is a functional equivalent to an occupational logic of the labour market (Damelang, Stops, and Abraham 2018, 410). The same occupation may be more or less successful in implementing closure, due to historical, political, or organisational differences between countries. For the time being, regarding occupational closure devices, "systematic information on institutional differences [...] is not available at EU level" (Eurofound 2017a, 38).

The link between occupational closure and wages seems relatively well established (cp. Haupt and Ebner 2020, 33), specifically for care occupations (Barron and West 2013; Peterson, Pandya, and Leblang 2014; Lightman 2017). Budig et al. (2019) show, for a sample of US-American care workers, that the largest wage bonuses are incurred by occupations marked by high skill and high licencing. For Germany, Rohrbach-Schmidt (2020) shows in a study on migrants that *if* they succeed in entering a licenced occupation in Germany, foreign men benefit from occupational closure just like native male workers.

2.2.5 Labour-market policy and collective bargaining

Countries can opt for different approaches to labour-market policy.[20] A successful *active labour-market policy* (ALMP), providing search assistance, counselling, wage subsidies, or training, raises the labour supply. On the one hand, this should exert a downward pressure on wages; on the other, ALMP measures can promote transitions into quality jobs by upskilling or improved matching, which raises productivity and thus wages. Generous *passive labour-market policy* (PLMP), in turn, can restrict the labour supply, in particular for low-paid jobs. If the wage replacement rate is high, it offers jobseekers an alternative to low-wage (and low-quality) employment. However, empirically, this effect seems very limited (Lehwess-Litzmann and Nicaise 2020). In addition, by allowing for a prolonged job-search, a high level of unemployment benefits can improve matching in the labour market, and thus raise worker productivity when they are back in employment (ibid.). For these reasons, generous PLMP expenditure should raise wage levels. As PLMP is not occupation-specific, it does not influence wage levels of EHW occupations in particular, but all low-paid occupations (Eurofound 2017a, 14). ALMP is also more relevant to the lower-paid jobs than the higher paid, as the former more often use wage subsidies (ibid.). Unlike PLMP, ALMP can include programmes targeted at specific occupations that exhibit staff shortages, such as re-training for elderly care.

Some countries have a strong tradition of *collective bargaining*, or alternatively, centralised bargaining results are extended by law to workers who are not organised by trade unions. Such a centralisation of

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[20] As for labour-market regulation, it affects both supply and demand, and is therefore covered further below in the text.

wage setting is also a feature of coordinated market economies (Hall and Soskice 2001), while in liberal market economies, pay negotiations take place around the individual employment contract, or at firm level. Depending on the country, collective agreements can be negotiated at the level of occupations, branches of economic activity, or for all workers. In the latter case, "occupations may be less important for the distribution of wages" (Eurofound 2017a, 38). Strong collective bargaining above all benefits low-paid workers, thus compressing the wage structure (Fernández-Macías and Vacas-Soriano 2015, 56).

EHW work is not a traditional domain of trade union activity like manufacturing. Still, due to the State's involvement as employer or financier, EHW wages are often negotiated centrally by public service unions, either at the national or regional level. The State's budgetary situation enters as an important marginal condition in wage negotiations; after the Eurocrisis, for example, public sector employees in many countries had pay freezes.[21] Another challenge for public service unions is the altruistic ethos of the care sector. As mentioned, many care workers are intrinsically motivated for public service, and care organisations often have their historical roots in charity organised by the church. The fact that many EHW workers are women can also play a role here, in the context of entrenched gender roles. Folbre (2001) terms care workers as "prisoners of love", who would not fight for higher monetary rewards—by going on strike—if that it is at their clients' expense, who are in need and to whom they have an emotional bond. For that reason, public service union's power to restrict the labour supply is a blunt sword compared to industrial trade unions.[22]

Still, centralised wage setting seems to have an effect on wages. Hipp and Kelle (2016, 265) show by bivariate analysis that the incomes of EHW workers across European countries are usually higher (with the exception of health professionals) if the share of workers covered by collective agreements in a country is higher. Unfortunately, no information is available on trade union density and the degree of collective agreement coverage of the individual occupational groups. Budig et al. (2019) show for care workers in the United States that fixing wages by collective agreement can have both a wage floor effect and a wage ceiling effect, depending on the bargaining power of different care occupations.

2.3 Labour-market regulation as a mediator of supply and demand

Labour-market regulation does not affect *either* labour demand *or* labour supply, but mediates their interaction (Oesch and Rodríguez Menés 2011, 507). It creates the legal framework by which exchange processes in the labour market can take place. A prominent example is *minimum wages*, which mark a wage threshold below which labour cannot be bought nor sold. Minimum wages particularly affect low-paid occupations, like assistant positions in care work, while occupations that would be remunerated higher also in the absence of regulation benefit less. Yet minimum wages can also "trickle up" if labour market actors try to maintain the wage distance between low-paid and higher-paid occupations. In sum, minimum wages generally compress the wage span.

Labour-market regulation also refers to aspects of job security, which can have an impact on wages. A strict *employment protection legislation* should raise wage levels by improving employees' bargaining

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[21] https://www.epsu.org/article/collective-bargaining-developments-public-services, last accessed 2022-10-21.

[22] Compared to industry, EHW workers are more often in small organisations, which can also contribute to trade unions difficulty. However, many EHW employees also work in medium (schools) or large organisations (universities, hospitals).

position and increasing tenure (and thus also firm-specific human capital). Legal possibilities for *atypical employment*, like fixed-term and temporary employment, are associated with lower pay because the concerned workers have a smaller bargaining power and tenure than those belonging to the core staff, and often they are offered fewer training opportunities by employers.

Also relevant with regard to wage levels is the *shadow economy*. If undeclared work is successfully reduced, this raises the number of (official) jobs and their wage level. Low-qualified care work can relatively easily be outsourced from the household to the informal sector (Hipp and Kelle 2016, 245). As informal care work is particularly poorly paid, if it occurs on a large scale, this puts wages of care employees under pressure. Countries which successfully curtail the shadow economy should thus tend to feature higher wage levels in childcare and elderly care services officially consumed by households (which is confirmed by descriptive analysis, cf. Hipp and Kelle 2016, 263).

2.4   Chapter summary

This chapter has provided an overview of the factors that can be at the origin of unequal monetary rewards between EHW occupations and all other occupations, or that could substantiate wage inequality among different EHW occupations. Where these characteristics differ from country to country, they can make it so that an occupation is paid differently across countries. Determinants can be located at the level of workers' individual characteristics, occupations, or branches, or can apply to whole segments of the labour market such as low-paid work or work in public service. Some factors intervene directly in the pricing mechanism, while other factors affect labour supply and demand and influence wages indirectly. We will briefly summarize below.

What *determinants suggest high, respectively rising, wages for EHW work*? First, various socioeconomic developments led to a rising demand for EHW services in the past decades: demographic ageing and women's growing labour-market participation has caused households to increasingly consume professional child and elderly care services. Expectations have risen with regard to the quality of these services, and occupational groups like psychotherapists and social workers have grown to cover newly discovered societal needs. Partly, these occupations are professions, featuring high levels of skill and autonomy. Some EHW occupations require highly qualified workers, which justifies elevated wage levels. In addition, EHW work is usually provided in direct interaction with customers, clients, or patients, and is mostly non-routine work. Labour-market theories, which predict growing shares of skilled (SBTC) or non-routine (RTBC) labour therefore suggest rising wages of such occupations. As a high service quality is often crucial for clients' well-being, some EHW occupations (and not only highly skilled ones) are protected in the sense that they require their members to possess specific educational credentials or passing exams. These requirements can be effective through the recruitment behaviour of employers, or they can be statutory. In both cases, the supply of workers to these occupations is limited (occupational closure), which has an upward effect on wages. EHW workers are often employed in public service and thus covered by collective bargaining, which usually helps to avoid particularly low wage levels but can also introduce wage ceilings for groups with above-average earnings.

Negative influences on wages in EHW occupations can stem from an undervaluation of care work, in particular if it is low-qualified work. Undervaluation of care work seems linked to its gendered connotation: traditionally, women offered care work without pay in the private household. Today, the

majority of working-aged women are in paid employment, and they represent particularly large shares of workers in EHW. Therefore, a wage penalty against women particularly affects EHW occupations (except university teachers and medical doctors, where the gender composition is more balanced). The continuous rise of female employment participation in recent decades also meant an over-proportional increase of labour supply specifically oriented to EHW occupations, which can have slowed down wage growth. Migration influxes to European countries (though it also brings additional demand for services) act as a supply especially for low-qualified care work, as migrants are often without qualification (recognised in the host countries). Another feature of EHW workers is their above-average PSM, i.e. the subjective satisfaction drawn from helping others. Such a non-monetary reward for working in EHW can offset additional monetary compensation due to a smaller wage elasticity of the labour supply. Altruistically minded workers engage also if pay is relatively low. Correspondingly, a high coverage by collective bargaining—if it exists at all—remains without much bite if there is less preparedness to actually go on strike. Withholding labour would mean leaving the needy clients alone, which goes counter the ethos of care work.

The structural weakness of clients also plays out in the financing mode of EHW services: in order to ensure service provision to everyone, care services are often paid for by the welfare state, instead of the direct beneficiaries. The State is the prime financier and provider of education, health care, and social work. Depending on how each branch is organised, the State may also be the only relevant potential employer. For example, teachers are usually in public service and are often also civil servants. The pupil does not pay the teacher out of pocket, and there is no negotiation of wages in the classroom. Teachers' wages are negotiated between the State and public sector trade unions, in a context of the government budgetary position, the (regional and prospective) balance of labour supply and demand, society's valuation of the public good of education, and the rules of wage setting (e.g. strikes by teachers, if they are public servants, are even ruled out by law in some countries). Unlike teaching occupations, other EHW occupations may be more steered by (formal or informal) markets, e.g. in elderly care services (Simonazzi 2009). However, compared to other goods and services, the societal necessity of EHW services makes that wage levels are more subject to political processes, while market-based pricing mechanisms play a smaller role.

It would be beyond the scope of this paper and beyond our knowledge to spell out the individual countries' real institutional differences covered in this research. The present working paper remains mostly descriptive, creating an *explanandum* for further comparative research. The next chapter will explain why it is not so straightforward to do this and then we will present our data and empirical strategy.

3   Data and method of our empirical analysis

The present chapter introduces the data source of our analysis (3.1) and explains the sampling procedure and the sample (3.2). Section 0 explicates the methods applied for income comparison. We will go into great detail, so the reader who is more interested in the empirical results of the analysis can skip this chapter.

3.1   The choice of a data source

A handful of cross-country harmonised datasets could suit the purpose of our analysis, most are provided by Eurostat ("European Statistical Office"), thus the European Commission. This applies to the following data products, all of which contain information on income, branches, and occupations: the EU-LFS, the EU Statistics on Income and Living Conditions (EU-SILC), and the EU Structure of Earnings Survey (EU-SES).[23] The original data are collected by National Statistical Institutes in the participating countries, following common guidelines, and then transferred to Eurostat, where it is centrally processed. The data are in principle available for research, but mainly produced for specific politico-administrative purposes. This means that suitability for research can be limited in some respects. The scarcity of comparative empirical studies, mentioned in the introduction, may partly be due to a scarcity of good cross-national income data.[24] For the present analysis, the most relevant criteria for choosing a data source are the sample size within the observed groups and the detail, quality and cross-national comparability of the information on income, branch, and occupation. We explain below why we opt for using the EU-LFS for our analysis.

3.1.1   The EU labour force survey (EU-LFS)

The EU-LFS has been conducted since 1983 and covers a growing number of European countries. The most recent waves include data from all EU Member States as well as some neighbouring and/or accession countries. The main aim the EU pursues with this survey is to provide comparable information on employed, unemployed and inactive persons of working age in European countries. The survey's universe comprises all persons aged 16 and over (residing in private households).

The EU-LFS's great asset is its large sample size. The yearly data file of the newest available wave consists of roughly 1.8 million observations, a number not reached by any comparable European data source.[25] The data covers all industries (currently reported in NACE-2010 coding) and all occupations (reported in ISCO-08 coding). For reasons of anonymisation, the degree of detail of the NACE item is limited to one

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[23] A further source of comparative income data is the Luxembourg Income Study (LIS), which is provided by a non-profit organisation registered in Luxembourg. The coverage of this dataset goes well beyond Europe, comprising around 50 countries. The price for this breadth is a weaker degree of harmonization of data between countries. While there is a certain degree of ex-ante harmonization of Eurostat data products due to the mentioned guidelines for Member States' data collection, the LIS harmonises data only ex post, within the limits of the feasible.

[24] In the context of their own research, Fernández-Macías and Arranz-Muñoz (2020, 5) remark that "data sources covering many countries and periods are needed, including adequate and comparable measures of the two main variables of interest: occupations and wages. In strict terms, there is no single international dataset that fulfils all these criteria".

[25] There is both a cross-sectional and a longitudinal component, especially the latter differs considerably between countries, e.g. regarding the time structure of its implementation. As we are interested in cross-country comparison, we will ignore the data's longitudinal properties.

digit, while the ISCO item comes with three digits. For the industry information, we have no reason to doubt a sufficient harmonisation between countries, but for occupational information, there can be variation due to historically grown and country-specific occupational profiles. However, this is not a problem specific to the EU-LFS.

Issues with the EU-LFS income information

By contrast, the income information currently contained in the EU-LFS does leave room for improvement (which could take place in the context of the survey's current revision, see below). Delivering income information was made mandatory for participating countries as of 2009. The reason for including this information corresponds very much to the aim of the present analysis: "The purpose of this variable, according to the explanatory notes, is to measure the effects of individual characteristics (sex, age) and labour market characteristics (professional status, occupation, activity) on monthly income." (Eurostat 2012, 3) However, income information is not provided in terms of currency units, but as deciles: for each observed person who is in dependent employment at the time of the interview, the item INCDECIL contains a number between 1 and 10, indicating his or her income decile in the context of the countries' income distribution of the survey year (Eurostat 2018, 140). Compared to monetary values, deciles mean an important loss of information, which impinges upon the possibility to do research on income with the current EU-LFS (cp. Eurostat 2012; Stehrer and Ward 2012):

(1) Deciles are by definition *less precise* than information on absolute income amounts. Particularly but not only at the margins of the distribution can two persons with substantially different incomes be in the same income decile. Changes of income are thus not necessarily signalled by a change of the income decile. (2) The original income information on which deciles are calculated is often rounded, which can be a problem if values cluster at the cut-off points between deciles. Deciles limit income analysis also in terms of what can be done with the data. In the EU-LFS, they are calculated within each national context. This makes for (3) if person X from country A is in decile 2 and person Y from country B in decile 3, we still do not know whether person X really earns a lower income than person Y in absolute terms, or in terms of purchasing power. The question pursued in this paper is not constrained by this particular problem, as we are interested in how much a certain type of work is acknowledged *within* a given country, compared to other types of work. A different problem that does affect our analysis appears when it comes to aggregating data (4) as Stehrer and Ward (2012, 31) point out: "while the data might indicate that the earnings for a particular job fall into a higher decile than another job, they do not indicate how much higher the earnings are in the first job than in the second – whether, for example, they are 5% higher or 50% higher – which can clearly affect the interpretation of differences." This problem not only makes a comparison between deciles somewhat unsatisfactory, but it also limits the validity of aggregated income information based on deciles.[26] Notwithstanding all these shortcomings, some authors have highlighted the adequacy of income decile data for international comparisons: "Using deciles is suitable for comparing wage differences across countries with different degrees of economic development and wage dispersion." (Mueller 2018, 14; cp. also Hipp and Kelle 2016, 247) Moreover, monetary income data also has its problems, e.g. outliers, as explained by Fernández-Macías and Arranz-Muñoz (2020, 4).

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[26] It is not correct to calculate an arithmetic mean based on the values of an ordinal variable. Stehrer and Ward outline a possible solution, i.e. complementing EU-LFS income deciles with monetary information from the EU-SILC.

Beyond the limitation to deciles, there are some further weaknesses of the EU-LFS income information in its current form. First, there are long delays in delivery of income data, permitted up to 21 months if the data stems from registers (instead of interviews). Second, there is a considerable number of missing answers for the item INCDECIL in some countries. In particular in Ireland, where income information is categorically not taken from proxy interviews. However, the "quality report INCDECIL", authored by Eurostat (2012), estimates that the bias caused by non-responses is rather negligible. Third, there are several types of harmonisation problems documented in the quality report. They have partly been tackled by more precise guidelines for participating countries, in effect as of 2017. By contrast, some issues remain unresolved in the most recent waves of data, or there is only weak documentation so that it can hardly be verified. One issue is that even though countries are held to report monthly net income, income deciles from a number of countries are based on gross income, and in some, there is a mix of both. Gross information is likely if countries do not conduct a survey but draw on register data.[27] In addition, if a survey is conducted, survey participants are not asked the same questions across countries; in some they are asked for exact income amounts, in others for earning bands. In the latter case, the cut-off points between income bands can also differ between countries. Finally, once the income information has been collected from all respondents, countries lack a unified approach for turning them into deciles. They either use cut-off values from external sources to sort a given respondent into a decile, or they transform the EU-LFS raw data it into deciles. Countries usually take sampling bias into account by an adequate weighting factor.[28]

Subsequent to the stricter guidelines that came into effect in 2017, Eurostat has not undertaken any new initiatives of harmonisation. Their efforts have concentrated on the new regulatory framework "Integrated European Social Statistics" that is applied from 2021 on.[29] There will thus be major changes to the EU-LFS, coming into effect as of the field year 2021. For the present, we have to work with the dataset as it has developed during the last decades and years, featuring a growing yet still imperfect degree of harmonisation.

3.1.2 Alternative data sources

In principle, the *European Union Statistics on Income and Living Conditions (EU-SILC)* could be an alternative data source for our analysis. The survey is provided by Eurostat since the year 2004, and like the EU-LFS, it features a growing number of participating countries.[30] Its main aim is "collecting timely and comparable cross-sectional and longitudinal multidimensional microdata on income, poverty, social exclusion and living conditions".[31] Its universe is the population in private households; altogether, about 130 000 households and 270 000 persons aged 16 and older are interviewed in EU countries (cross-

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[27] In principle, gross information would be better than net in the context of our analysis, as it is not influenced by countries' different taxation systems. We (have to) work under the assumption that tax systems impact the occupational groups we observe no different from other workers.

[28] Yet it seems to us, from looking at the distribution of values, that at least Malta does not use any weighting. We will drop Malta from our sample for this reason.

[29] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019R1700&from=EN, accessed 2022-12-02.

[30] See "Datasets availability table and release calendar", https://ec.europa.eu/eurostat/documents/203647/771732/Datasets-availability-table.pdf, accessed 2021-01-19.

[31] Citation from Eurostat's website, http://ec.europa.eu/eurostat/web/microdata/european-union-statistics-on-income-and-living-conditions, accessed 2021-01-19.

sectional component).[32] Compared to the EU-LFS the EU-SILC's sample size is significantly smaller. The quality of the income information is higher, however, as this is one of the EU-SILC's main topics (Eurostat 2012, 10), and the item on gross employment income has hardly any missing values. The data consists of absolute values in currency units, it is not coarsened to income deciles as in the EU-LFS. Also in terms of harmonisation between countries, the EU-SILC seems at an advantage. Eurostat's guidelines for participating countries on which income components to include are more precise, and we can be sure that there is no mix of gross and net amounts. Harmonisation is not perfect, though: as in the case of the EU-LFS, the income information "can be either extracted from registers or collected from interviews".[33] The income information reference period is always a whole year in the EU-SILC, and usually it is the previous calendar year.[34]

However, the fact that the EU-SILC's income information applies to a full year period lying sometime in the past poses a problem for an analysis of earnings *by occupation*. There is a temporal incongruence, as the information on a respondent's occupation, like most EU-SILC employment information, applies to the *current* moment, the time of the interview. We cannot be sure, therefore, that the measured income was generated by exercising the occupation indicated to us. This can be remedied by filtering out all persons with a "change of job since last year" (item PL160), but it means losing these cases. Another problem consists in the level of detail of the occupational information. In the EU-SILC, occupation is coded on the ISCO-08 classification, but only with *two digits*.[35] In spite of the high quality of the EU-SILC's income information, the lack of precision of the occupational information (which is deliberate and for reasons of anonymisation) makes this data source unsuitable for our purpose. It would not be possible to identify workers with the occupations we target, and to exclude others.

Another possible alternative to the EU-LFS is the *EU Structure of Earnings Survey (EU-SES)*. This survey is specifically for comparatively analysing income in the EU and partner countries. The first wave of data was collected in 2006, subsequent waves followed every four years. The most recent publication of EU-SES data was spring 2021 and applies to the reference year 2018. Unlike the EU-LFS and EU-SILC, it is not all employees respectively all workers who are part of the universe of the EU-SES, but data are collected in enterprises with at least ten employees. This restriction is not without relevance for the present analysis, as employees tend to earn more in large firms (Schröder and Schwarzhappel 2020). In any case, the quality of the EU-SES data would recommend this data source for our purpose, at least as a complementary source of data. The items contained on the "form of economic and financial control of the enterprise" and on collective pay agreements would open up an interesting additional dimension of analysis, which other datasets do not offer. At the time of performing the analysis, however, this could not be implemented due to the Covid-19-related closure of the on-site access to data via the Safe Centre. The anonymised data provided for desk research do not contain ISCO information any more detailed than the two-digit level (like the EU-SILC).

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[32] https://ec.europa.eu/eurostat/web/income-and-living-conditions/data, accessed 2021-01-19.

[33] https://www.gesis.org/en/missy/metadata/EU-SILC/, accessed 2021-01-19.

[34] Ireland is an exception, with a 12-month moving reference period preceding the interview.

[35] Contrary to the EU-SES (see below), the EU-LFS und EU-SILC are provided for research exclusively in the form of scientific use files, which feature aggregations of the initial data in order to guarantee anonymity. There is no possibility to access less aggregated data on-site, e.g. in a safe centre.

A necessary condition for our analysis is the possibility of a deep disaggregation in the occupational dimension, so the EU-LFS appears as the best choice. Our analysis will thus be based on the EU-LFS, fully considering the current restrictions on the quality of income data, as will be explained in the following section.

3.2   Sampling

This section will explain how we get from the raw data of the EU-LFS to our sample of analysis, and it will outline this sample quantitatively.

3.2.1   General selection of cases from the EU-LFS

In the following, we will list some filtering criteria, which we apply to ensure interpretability and to deal with peculiarities of the data source. As mentioned, the EU-LFS include all persons aged 16 and over who reside in private households. We first drop the very small number of persons aged 70 or older who are still working.

Second, we only keep persons "*who did any work for pay or profit during the reference week*". Persons who were absent from work during the reference week (e.g. due to illness, holiday, or further training) are not considered because this absence might affect their reported income. For example, when someone is ill and receives sickness allowance, the income partly reflects the social insurance arrangement features, which we do not seek to analyse here. We also exclude persons who have been laid off, conscripted for compulsory military or community service, or simply unemployed or economically inactive during the reference week.

Third, we only look at *dependently employed workers*, instead of self-employed or family workers, because in the dataset, there is no income information for the latter two groups. The item INCDECIL reports for each dependent worker the income decile relative to all employees in the same country and year. The incomes of civil servants are included in the data.

Fourth, we restrict our sample to persons working full time, which we define as a corridor between 35 and 44 hours (included) per week. In this step, we eliminate around 30% of observations from our sample because it would be misleading to compare monthly earnings between workers with substantially different working hours. Earnings are closely connected to workers' time investment, and as occupational groups as well as countries differ in the share of part-timers, a comparison without restriction to full-time workers would not lead to usable results.

Fifth, we drop from our sample the small number of persons known to work abroad because they are not part of the national labour market structures that we seek to analyse: The number of observations we lose is relatively small. The share of (economically active) participants in the survey working in their own country of residence is usually around 98% or 99%. The minimum of just over 95% is observed in the small countries of Belgium and Slovakia.

Sixth, we filter out persons whose working hours are missing, zero, or reported as varying ("usual hours cannot be given because hours worked vary considerably from week to week or from month to month") because we need to be able to judge the monthly income against the backdrop of working hours invested by the worker.

To this point we have dealt with criteria that follow from the subject of our analysis and apply independently of the data source. By contrast, features of the data source that affect our sample are missing values in important variables, which can be caused by methodological breaks.

We are interested in using as many data waves as possible from each observed country, in order to have a longer historical perspective and to increase the number of observations in each occupational group. We go as far back in time as possible but need to ensure comparability. Since the information on economic branch and on occupation are of central importance, we can only use data waves that already apply the *current ISCO and NACE definitions*. Knowing that the NACE second revision stems from 2008 and that the ISCO-08 is being used in the EU-LFS since 2011, the earliest wave we can possibly use is 2011. However, due to some data quality issues in 2011, we use the *year 2012 as the earliest historical year* in our analysis. The last year considered in the analysis is 2020 (data released in 2021). Due to the above-mentioned renewed survey methodology as of the data collection year 2021, limiting our sample to years up to 2020 is not only practical with regard to the project's timing, but also avoids issues of harmonisation of data over time.

Some observations in our selection have a *weighting factor*, which is missing or equivalent to zero. This obliges us to drop some cases from Denmark, Spain, and Finland in all years between 2012 and 2020, as well as from Luxembourg in the years 2015 and 2016 and from Latvia in 2017. In all other countries and years, the weighting factor is filled.

A lack of adequate *occupational information* further requires us to drop four out of 31 EU-LFS countries: Bulgaria, Malta, Poland, and Slovenia. These countries do not provide the ISCO item (isco3d) in sufficient detail (cp. Mueller 2018; Hipp and Kelle 2016). For example, persons working in education are often simply coded as "teaching professionals", without differentiating between, for example, primary, secondary, or vocational education teachers, as other countries do.

Furthermore, and as mentioned, the *information on income* is not a strength of the EU-LFS in its current form, and we will have to drop more cases from our sample for this reason. So, we drop Iceland, Norway and Sweden, as these three countries provide no income information at all in the EU-LFS. This further reduces the number of observed countries to 24.

Already in the original EU-LFS dataset, the distribution of income deciles is not in all country-years what should be expected (e.g., the weighted average deviates from 5.5.). Still, we chose not to drop any country-years for that reason because no systematic bias of our results is to be expected (see methods section).

It should be mentioned that our sample has a high number of missings in the income variable in a few countries and years (which is also commented on in the EU-LFS quality reports). This strongly depresses case numbers in several survey years in France, Ireland, Finland, and Luxembourg, where not even half of the sampled observations provide income information in most years (cp. Appendix table 1). Also, in Denmark, Greece, Croatia, Slovakia, and the United Kingdom, there are substantial numbers of missing values. In all other countries still in the sample, income information is usually provided for at least 90% and often for almost 100% of observed persons. We assume that where missings exist, they are random: speaking about income is uncommon in some countries, which should affect respondents of all income strata so that no bias is to be expected (cp. Eurostat 2012). Deleting countries based on a high number of missings would not be a sensible choice given that some countries apply imputation procedures to fill

missing income data before delivering the data to Eurostat (cp. EU-LFS quality reports). Even if there is information on income in the dataset, it is thus not necessarily first-hand empirical data.

To avoid counting the same person twice within the same year, we drop some duplicates that erroneously occur in yearly EU-LFS data by the procedure described in Mack et al. (2016, 17).

Last but not least, we need to deal with the situation that some countries make use of their right to deliver income information with a delay, or do not contribute data to the EU-LFS at all in some country-years (see Table 2 in the next section). This is a problem for our analysis because if we do not have data for a country-year, this will make the country and its specificities weigh less in averages calculated across countries (and several years). We opt for filling gaps by substituting the data from the most recent year for which we possess the data (see below for documentation). This substitution will not be detrimental to our results because the income distributions we analyse are not very flexible from one year to the next (employment contracts and collective agreements do not change every year).

The following subsection explains the choice of occupational groups in the EHW field on which this analysis will focus.

3.2.2 Selection of occupational groups in the field of EHW

We have already explained in the introduction what guides us in selecting workers for our observation: we are looking at frontline workers in the field of EHW. In other words, we focus on care workers who provide a service that "develops or maintains the capabilities (cognitive, physical, emotional) of the recipient" (Budig and Misra 2010, 445) and who interact personally with the recipient in the course of service provision (thus they are frontline workers). Our selection of observed workers can be concretised by using the information on branch and occupation contained in the EU-LFS. This will be explained in the following discussion.

Every worker in the formal economy can be classified by a branch of economic activity (e.g. according to the NACE classification) and an occupational group (e.g. ISCO). While the branch derives from the organisation's main economic activity where they work, and thus the final product, the occupational group follows from the tasks performed by the worker. As it usually takes inputs from several different occupations to establish a certain product, different occupations are attributed to each branch, just as one and the same occupation appears in several branches.[36] To select persons both by the type of work they do and by the final purpose of this work, we cross the perspective of branches with the perspective of occupations like in a two-dimensional grid structure (cp. Budig and Misra 2010, 445).

A worker's branch of economic activity is documented in the EU-LFS in the form of NACE-2010 sections. We chose the following three branches: education, human health and social work activities, and activities of households as employers.[37] The level of detail at which we can select occupations is defined by the first

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[36] While some occupations are relatively closely linked to a specific branch, others are more far-flung, e.g. while courts are of course a workplace for legal professionals, many also work in private companies.

[37] We chose this latter branch in order to include care workers not employed by firms but households. The denomination of NACE branch 20 includes also "undifferentiated goods- and services-producing activities of households for own use". However, this does not apply in our context, as we only look at dependent employment.

three out of four digits of the ISCO-08 ("minor groups"). Table 1 presents the care occupations included in our analysis.

To create a better overview, we roughly group occupations by field of activity. [38] We distinguish between "education", "health", and "welfare", using the terminology proposed in a report of the European Institute for Gender Equality (EIGE 2017, 80) to the EU commission. [39]

Table 1: Selected occupational groups (ISCO minor groups), by field of activity

Education		Health		Welfare	
531	child care workers and teachers' aides	221	medical doctors	263	social and religious professionals
234	primary school and early childhood teachers	222	nursing and midwifery professionals	341	legal, social and religious associate professionals
233	secondary education teachers	322	nursing and midwifery associate professionals		
232	vocational education teachers	532	personal care workers in health services		
231	university and higher education teachers	321	medical and pharmaceutical technicians		
342	sports and fitness workers	226	other health professionals		
235	other teaching professionals	325	other health associate professionals		

Note: Source EU-LFS, own arrangement.

Specific information on the occupational groups, on their tasks and duties, is provided in Appendix table 5. Elderly care workers are not explicitly mentioned in the table, it should therefore be noted that those without professional qualification are included in the group "personal care workers in health services", while those who did receive specific training are in the group "nursing and midwifery (associate) professionals".

In our analysis, we will merge associate professionals and professionals in some cases and treat them as one single group. For example, we merge "nursing and midwifery *professionals*" with "nursing and midwifery *associate professionals*" and two other pairs. We do so in order to abstract from potential national differences of classification, which might lead to persons with similar tasks being ranked as professional in one country, but only as assistant professional in another country, just because they have received different levels of training, according to countries' traditions.[40] An advantage of merging is the rise of case numbers per group; a disadvantage is that we lose some precision in cases where the

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[38] To be distinguished from the branch of economic activity.

[39] EIGE defines the following ISCO-08 groups as EHW occupations and fields of employment: 22 Health Professionals, 23 Teaching Professionals, 32 Health Associate Professionals, 53 Personal Care Workers. Our choice of occupations is identical, except that we do not include veterinarians (ISCO 225) and Veterinary technicians and assistants (ISCO 324), as we limit our analysis to services provided to human beings.

[40] For example, in Germany, as one of the last countries in Europe, training for midwives was recently transferred from vocational schools to applied universities and curricula were revised. As of 2021, midwifery is an academic profession in Germany, which it had been for long in most other European countries. Yet this does not really change the work that midwifes do after the completion of their training, and it remains to be seen whether it changes remuneration.

distinction between professionals and associates is substantiated by real qualification and task complexity.[41]

In the following, we outline the sample and observed population that we get on the basis of the described selection criteria.

3.2.3   Description of the sample and observed population

The above-described sampling criteria led to the sample displayed in Table 2. All in all, we count just under 500,000 observations that fulfil all general sampling criteria (being an employee, working in the country of residence, usually working hours per week between 35 and 44 hours, having worked for pay during the reference week, featuring non-missing income information in the dataset and a non-missing weighting factor) AND work in one of the selected branches and occupational groups. [42] We have roughly 55,000 observations in each of the nine survey years.

As explained, original data are not available for all country-years. With an observation period of nine years and with 24 countries, there is a maximum number of 216 country-years for which we could possibly find data in the EU-LFS. In effect, there are 206 country-years where we have data and ten country-years where we do not. We thus substitute data in ten cases, copying the information from the most recent country-year where we have data. The cases where we do this are highlighted in Table 2 by brackets around the case number. For example, we do not have Austrian data for 2020, as Austria usually delivers income data with some delay. So, we use the data from 2019 twice, for 2019 and 2020. For the case of the United Kingdom in 2012, we use the information from 2013. The ten substitutions we make led to a balanced panel of country-years, which we need in order to obtain results that are not biased by an arbitrary lack of data.

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[41] The fact that occupational groups may play slightly different roles in different countries always remains an issue (e.g. the division of labour between nurses and medical doctors can differ between countries). These differences are very complex and cannot be completely captured by an international classification like the ISCO.

[42] The numbers count independent observations. In some countries, the same worker is observed several times a year. This can be either for generating data on short-term changes or in order to reduce the number of questions per interview and thus limit refusals ("wave approach"). In the table, however, each person is counted only once. Still, as the EU-LFS do not have a panel character across years, we cannot exclude that one and the same person is observed in several years.

Table 2: Number of sampled frontline workers in EHW, by country and year

Country	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
AT	2,125	2,182	2,146	2,075	2,259	2,275	2,216	2,214	(2,214)	19,706
BE	1,713	1,681	1,841	1,757	1,842	896	880	943	746	12,299
CH	1,679	1,637	1,634	1,842	1,763	1,856	1,879	1,843	1,906	16,039
CY	482	468	486	501	473	458	469	476	443	4,256
CZ	1,175	1,241	1,236	1,253	1,238	1,267	(1,267)	(1,267)	(1,267)	11,211
DE	12,640	12,449	12,760	13,056	14,691	14,968	15,232	15,589	(15,589)	126,974
DK	3,696	3,527	3,766	3,594	3,416	3,428	3,704	3,383	3,723	32,237
EE	510	531	583	560	557	686	790	778	754	5,749
ES	2,828	2,690	2,703	2,871	2,855	2,832	2,954	3,074	(3,074)	25,881
FI	1,305	1,244	1,278	1,277	1,316	1,228	(1,228)	1,261	1,251	11,388
FR	4,404	1,657	1,895	1,862	1,883	2,000	1,894	1,884	1,374	18,853
GR	924	847	953	1,042	1,036	1,057	963	1,019	956	8,797
HR	414	424	457	495	498	438	519	502	489	4,236
HU	3,423	3,308	3,338	3,182	3,196	3,150	3,148	3,076	2,860	28,681
IE	1,225	1,103	933	854	843	1,065	991	1,145	839	8,998
IT	6,385	6,536	6,563	6,459	6,563	6,805	6,645	6,700	6,683	59,339
LT	1,054	1,069	873	1,126	1,191	1,267	1,343	1,275	1,095	10,293
LU	495	373	334	321	295	303	198	277	258	2,854
LV	691	752	838	948	859	499	499	300	335	5,721
NL	1,070	1,384	1,177	1,032	1,075	1,110	1,281	1,101	1,105	10,335
PT	2,297	2,320	2,502	2,747	2,828	2,803	2,915	2,996	2,517	23,925
RO	3,062	2,989	2,992	3,632	3,496	3,673	3,760	3,618	3,425	30,647
SK	789	758	728	727	1,033	1,068	1,169	1,177	(1,177)	8,626
UK	(1,364)	1,364	1,394	1,353	1,378	1,407	1,435	1,479	(1,479)	12,653
Total	*55,750*	*52,534*	*53,410*	*54,566*	*56,584*	*56,539*	*57,379*	*57,377*	*55,559*	*499,698*

Note: Source EU-LFS, own calculations. Note: Unweighted values. (Brackets) mark country-years with a lack of original data. Information from the adjacent country-year was substituted to fill the gap.

As we seek to compare frontline workers in EHW activities to other workers, persons who fulfil our general sampling criteria, but work in other branches and occupations, are also part of the (extended) sample. Across countries and years, the complete sample contains 4,178,170 individual observations across all 24 countries and nine years (Appendix table 2). Countries are clearly represented unequally in the sample. This is both due to unequal population sizes and to the design of national surveys that generate data for the EU-LFS. The latter will be compensated by weighting factors. *From here on, all information will be presented in weighted terms*, thus corrected for the unequal selection probability of persons within countries.

To know more about the unequal representation of countries in the (weighted) observed population, we can look at Graph 1. By far the largest fraction of EHW employees is located in Germany, making up 21.7% of the observed population.[43] (We again pool observations across several recent years.) Also France, Spain, and the United Kingdom constitute more than 10.0% each, and Italy follows closely with 9.3%. The mentioned five countries together represent more than two-thirds of the observed population of EHW

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[43] Also, in terms of (unweighted) sample cases, most are from Germany, which is due to the combined effect of the population being large and the national survey "Mikrozensus" being obligatory for all selected persons. This outcome leads to a small share of refusals, even for the survey item on income.

employees. The remaining 19 countries in the sample together contribute almost one-third of observations, ranging from 4.8% in Romania to just 0.1% in Luxembourg.

Graph 1: Full-time employees in education, health, and welfare. Share in the observed population, by country, 2012–2020 (pooled)
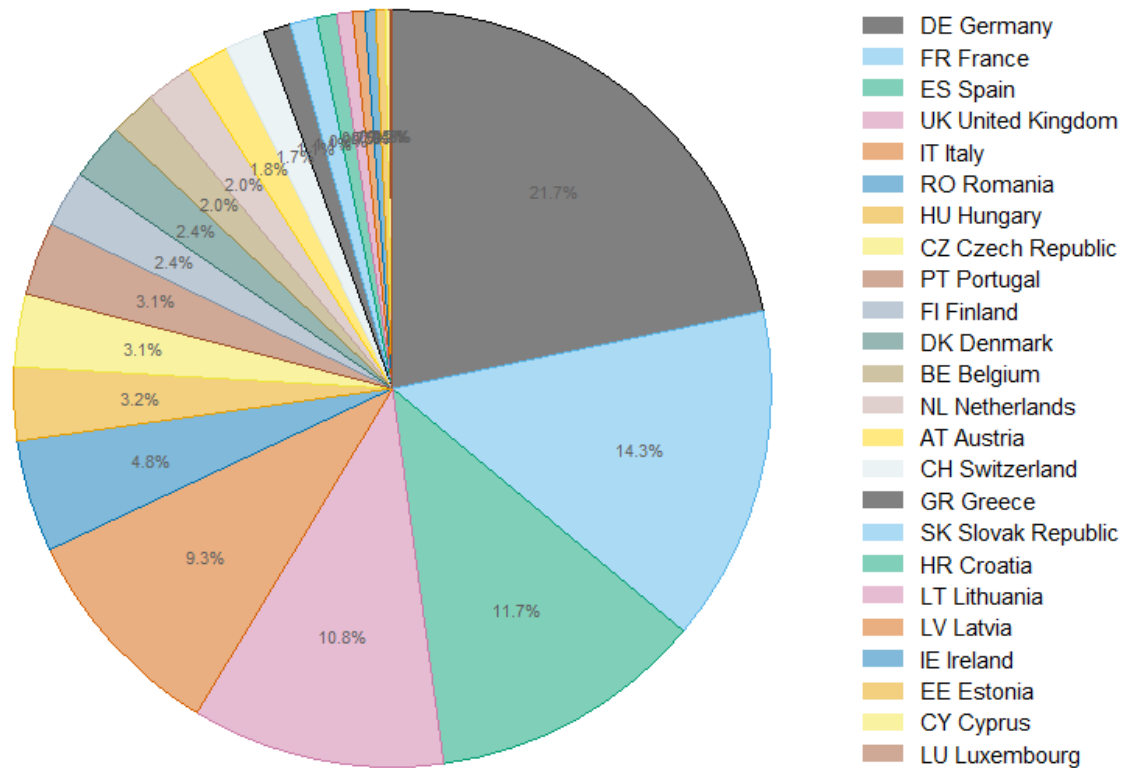
Note: Source EU-LFS, own calculations. Weighted values.

As explained above (3.2.2), we distinguish 13 occupational groups in the EHW fields. These groups together make up 14.2% of full-time employees in the period from 2016 to 2020, across the observed 24 countries (Table 3). The remaining 85.8% work in non-EHW occupations. Among EHW employees, not all work in branches that we focus on. Our observed EHW workers are employed in establishments either belonging to the branch of "education" or "human health and social work activities" (NACE 2010), or they work for private households (e.g. live-in elderly care). And 11.7% of full-time workers in the observed population work both in an EHW occupation and in one of the mentioned selected branches.[44]

Table 3: Structure of full-time employees with regard to branch and occupation, average across 24 European countries, 2016–2020

	EHW occupations	non-EHW occupations	all occupations
selected branches	**11.7%**	5.4%	17.0%
other branches	2.5%	80.4%	83.0%
all branches	14.2%	85.8%	100.0%

Source: EU-LFS, own calculations. Note: Weighted values.

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[44] Among all full-time employees, 2.5% do work in EHW occupations, but not in a branch where this kind of work is typical for the product, e.g. a doctor employed not in a hospital but at an insurance company, or a teacher not working in school, but for a schoolbook publishing company.

Between the 24 sampled countries, the share of full-time workers in EHW occupations and corresponding branches differs a lot, ranging from 20.5% in Finland and 18.3% in Denmark to only 9.0% in Luxembourg and 7.4% in the Netherlands (Appendix graph 1). Part of this gap can be connected to the differing provision of EHW services. But considering that we focus on employees working between 35 and 44 hours per week, the working time regime is a more important explanation: many Dutch teachers, nurses and personal care workers, etc., work part-time. For the purpose of comparing monthly wages across countries, however, it is useful to concentrate on those who do work full-time in all sampled countries.

Focussing on the 11.7% of selected workers in EHW occupations and branches, Table 4 highlights the differing shares of EHW occupations in the observed population. The shares pertain to the distribution across 24 countries, as if all observed countries were one single entity without borders in between.[45] The field of education makes up about one-third of observations. The most important groups are "primary school and early childhood teachers" with 10.2% and secondary education teachers with 9.7% of all EHW employees on average across the years 2012 to 2020. Apparently, the share of child care workers and teachers' aides has slightly grown between the first and the second half of the observation period, from 5.2 to 5.5 percent of EHW workers. The occupations connected to health care constitute more than half of our observed employee population, the largest occupational groups being nurses and midwifes (21.0%, classified in one single category) and "personal care workers in health services" (15.9%). Medical doctors represent 4.9% of our observed EHW workers. Within the observation period, the share of doctors grows slightly, while the share of nurses and midwives declines somewhat.

Table 4: Composition of full-time employees in education, health, and welfare by occupational group, by period. 24 European countries

Field of activity	Occupational group	Share (%)		
		2012–2020	2012–2015	2016–2020
Education	child care workers and teachers' aides	5.4	5.2	5.5
	primary school and early childhood teachers	10.2	10.3	10.2
	secondary education teachers	9.7	9.6	9.7
	vocational education teachers	2.5	2.6	2.4
	university and higher education teachers	3.7	3.6	3.8
	sports and fitness workers	0.3	0.3	0.3
	other teaching professionals	3.5	3.6	3.3
Health	medical doctors	4.9	4.7	5.0
	nursing and midwifery (associate) professionals	21.0	21.3	20.8
	personal care workers in health services	15.9	16.1	15.7
	medical and pharmaceutical technicians	3.0	3.0	3.0
	other health (associate) professionals	9.2	9.2	9.1
Welfare	social and religious (associate) professionals	10.9	10.4	11.2
Total	*Total*	*100.0*	*100.0*	*100.0*

Source EU-LFS, own calculations. Note: Weighted values. 24 countries: AT BE CH CY CZ DE DK EE ES FI FR GR HR HU IE IT LT LU LV NL PT RO SK UK.

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[45] This implies that the occupational structures of countries with bigger populations have more influence on the total distribution. For example, as Germany has many more inhabitants than, say, Belgium, it counts more EHW employees. Therefore, the German distribution will influence the overall distribution of EHW workers more than the Belgian distribution does.

The group of "social and religious (associate) professionals"—the only group observed in the welfare sector—represents 11.2% of EHW workers on average between 2012 and 2020. This occupational group seems to be growing in this period, from 10.4% between 2012 and 2015 to 11.2% between 2016 and 2020. It is still important to keep in mind that we only look at full-time employees here; the evolution of the number of workers per head may be different.

3.3   Method of analysis

The aim of our analysis is to identify the relative income positions of selected occupational groups in European countries. The EU-LFS is a very rich data source in terms of number of observations but making good use of the income information is a major challenge, as this information consists of income deciles. In this section, we will show why this is a challenge (3.3.1) and how we can overcome it (3.3.2) so that the EU-LFS can be used for comparing incomes between countries.

3.3.1   Part-time work as an obstacle for the cross-national income comparison

A descriptive cross-national analysis of the EU-LFS income information, as it is, would lead to incorrect results. This is an implication from the information being provided as deciles, calculated on the basis of *all* employees' earnings in a given country and year, no matter their usual weekly working time. Clearly, a worker's monthly income, and thus their income decile, depends on their personal working time. The issue is that, in addition, their income decile (though not their absolute income) also depends on the incomes of *other workers* of the same country and year. For example, especially if the person is a full-time worker, their income decile will tend to be higher if there are many *part*-time workers in the same country, because the latter are likely to gain a lower monthly income.

This issue is illustrated by Graph 2, which plots the income decile of full-time workers against the share of part-time workers in the same country.[46] There is an almost linear relationship. The more part-time workers in a country, the higher the average income decile of full-time workers in that country. Why is this a problem for the analysis? If we compare the average *monthly* income of a given occupational group between these countries, we need to make sure to compare between groups with a similar number of working hours (as it would not be fair to compare full-timers in one country with part-timers in another country). However, even if we concentrate on, say, persons working between 35 and 45 hours per week in both countries, we will most probably find that the occupational group earns better in the country with the higher share of part-timers because they push the relative earnings of the observed full-timers upward in the income hierarchy of deciles.

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[46] Full-time workers defined as those with a weekly working time of at least 35 hours.

Graph 2: National average income decile of full-time workers and national share of part-time workers, by country, 2019
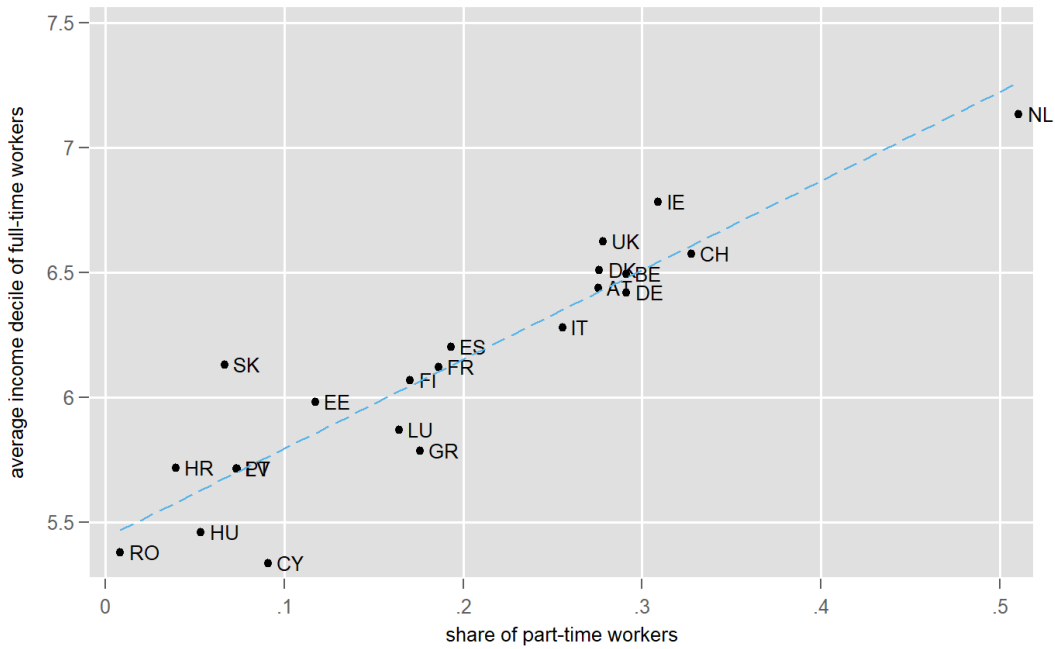
Source EU-LFS, own calculations. Weighted values. LT left out due to implausible mean income decile in that year.

We know from Graph 2 that the highest share of part-time workers is in the Netherlands, the lowest in Romania. Consider Graph 3, which shows the distribution of full-time workers across the ten income deciles:

Graph 3: Distribution of full-time workers by income decile. Netherlands and Romania, year 2019
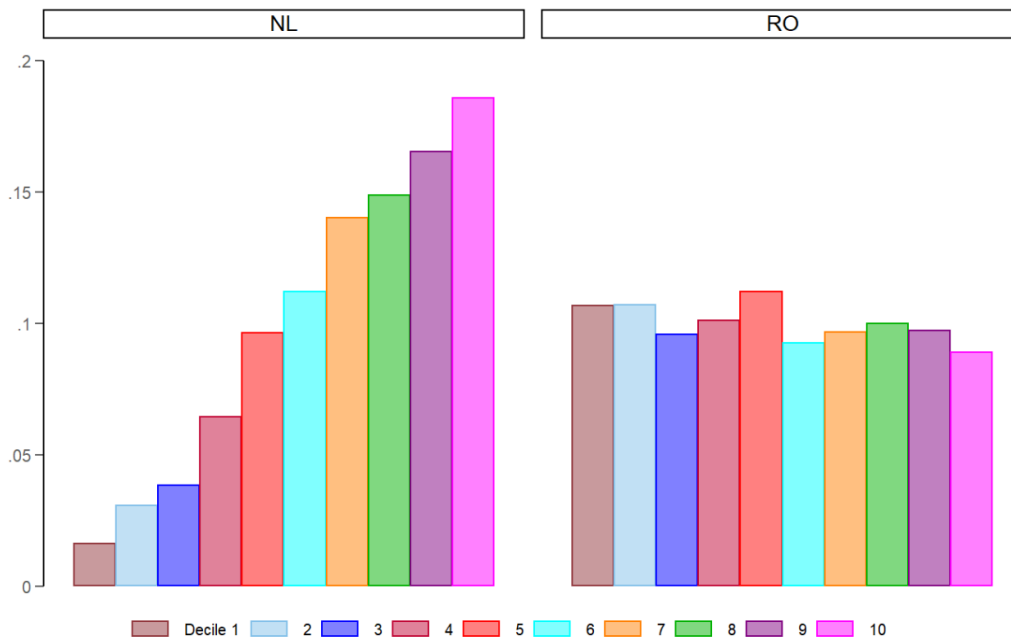
Source EU-LFS, own calculations. Weighted values.

The Netherlands features a distribution that is very much skewed: almost 20% of full-time workers are counted in the top income decile, and only just under 2% are in the lowest income decile. This is so because, as a full-timer, it is very probable to earn above the lowest 10% of (monthly) incomes, precisely because there are so many other workers in the Netherlands who work only a small number of hours per week. By contrast, in Romania there is a flat distribution: full-time workers are almost equally distributed across income deciles, each of which contains approximately 10% of full-time workers, including the lowest income deciles, because there are almost no part-time workers in Romania.

For this reason, a cross-national comparison of deciles as such would be flawed. This is a problem that has been ignored, to our knowledge, by subsequent studies based on income information of the EU-LFS. The above reflections make it clear that the problem does go away if we eliminate all persons working less than full-time from our sample: the effect of the varying part-time shares is inscribed in the very income deciles of the full-time workers. Note that if we were able to compare absolute (monetary) income, this problem would not even occur, but such data is not part of the EU-LFS in its current form (3.1.1).

3.3.2 Different levels of comparison: workers and occupations

As argued in the preceding section, there is a need to find an analytical strategy that can use income decile information in spite of the unequal shares of part-timers across countries. Without such a strategy, in our view, the EU-LFS' income information cannot be properly used for comparing incomes cross-nationally. We propose the following: we do not analyse deciles as such, but how income deciles of an observed group relate to income deciles of another group. We can do this both at the level of workers (approach 1) and at the level of occupations (approach 2):

Approach 1: We compare full-time workers' incomes in selected occupations with full-time workers' incomes in general. In other words, the mean income (decile) of all full-time workers serves as a reference value. The average income (decile) of each selected occupational group is compared to that value. All these averages are calculated over individuals, using weights to consider unequal selection probability. The observed persons' mean income decile is in the numerator and the general mean income decile in the denominator. We can thus interpret the relationship between both income levels as factors or also express them in percentages. For example, we can say that medical doctors earn 2.0 times (or 100% *more* than) the average earnings of full-time workers in country X, while in country Y they earn only 1.3 times the average (thus 30% more).

Approach 2: As an alternative perspective, we do not compare workers with workers, but occupations with occupations. More precisely, we compare the weighted average income attributed to full-time workers of an occupational group[47] with the incomes achieved by all other occupational groups. Also, for each of the latter occupational groups, the income is calculated as the weighted average income position of its individual members. However, the income across all occupational groups, our reference value, is a simple unweighted average, which means that all occupational groups, no matter how populous, are given

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[47] If we look at the relative income of several EHW occupations taken together, several occupational groups are at once in the numerator. In this case, in approach 2 we also weigh the mean incomes of these groups equally, e.g. medical doctors' (weighted) mean income will weigh as much as the mean income of the group "nurses and midwives", no matter whether there are more or less doctors compared to nurses and midwives.

the same weight. We also call this reference value an "anchor value", with more details below on how to calculate it.

The respective merits of approach 1 and approach 2

The second approach thus abstracts from the unequal number of workers between occupational groups within and between countries. This approach is helpful if one seeks to control for structural differences. For example, an occupational group, which is generally highly paid such as finance specialists tends to be relatively large in a country with a strong financial industry. Another country may lack an important financial industry, and also lack other industries of high added value, but feature many low-paid jobs in tourism and agriculture. Such country differences have an impact on how the income of a given EHW occupational group is judged. Let us take for instance nursing, an occupation that realises approximately medium incomes across countries. In country A, where many persons work in highly paid occupations, nurses' relative incomes will be below average according to our measurement approach 1. By contrast, if many workers in country B tend to work in low-paid occupations and few workers in high-paid occupations, this will lift nurses' income position above the average of workers in this country. If we now compare nurses' income positions between countries, nurses will clearly earn more in country B than in country A. However, this outcome is driven not by real incomes differences of nurses, but by structural differences of both countries' employment systems. Approach 2, which abstracts from the number of workers in each occupational group in each country, is unaffected by these structural differences.

To give some idea about the different national income structures in our country sample, Graph 4 connects the income levels of occupations with the number of employees in these occupations. For each country, all occupational groups (usually just above 120) are ordered by their average income position and grouped into quartiles (with approximately 30 occupational groups each). Then, the share of each quartile in the total number of employees is calculated. If we look at the grey sections of the bars in Graph 4, we see the share of employees in occupations which are among the lower 25% in terms of average monthly incomes, e.g. street vendors. In some countries, there are particularly many workers in these low-paid occupations. They represent more than 25% of all full-time employees in Cyprus, Spain, Greece, Croatia, Hungary, Italy, Latvia, Portugal, Romania, and Slovakia (still focussing on the segment with 35 and 44 weekly working hours). This means that when looking at teachers, who usually earn average or above-average incomes, their social position will be even higher in the latter countries, due to the numerical strength of workers in lower-paid occupations. By contrast, in Switzerland, Denmark, Finland, the Netherlands, and the United Kingdom, we find particularly many workers in the quarter of the most highly paid occupational groups. The more occupations like IT-specialists, financial experts, or company managers are populated, the lower the relative income position of, e.g. teachers. Professionals who hold such highly paid jobs may be well paid also in countries like Greece and Hungary, but they do not pull the general income average upwards so much due to their smaller number.

Graph 4: Shares of workers in the labour market, by income quartile of occupational groups, year 2019, by country (%)

Source: EU-LFS, own calculations. Weighted values. Year 2019. Full-time employees only.

Also, when looking at the composition of full-time EHW workers, we find structural differences between countries (Appendix graph 2). If we compare all employees in EHW activities between country A and country B, we may thus speak about two groups that are different in terms of qualification and tasks.[48] This is why approach 2 compares occupations with occupations, instead of comparing workers with workers as approach 1 does.

However, approach 1 also has its merit: if we want to know how nurses in a given country are positioned in their society as far as income is concerned, it is just this perspective that we need. Structural differences between societies are real, and the labour market structure in a given country is reality for workers there. By choosing an occupation, a person also chooses a corresponding social position in a country, no matter if this position would be different in another country for the same occupational choice. Approach 2, by contrast, has the merit of better reflecting the income position of an occupation abstracting from structural country differences, or from structural shifts over time.

More details on the calculation of approach 2

In the remainder of this section, we will explain in more detail how we proceed when implementing approach 2, against the backdrop of data restrictions. For our each of our two approaches, we build an anchor value, which represents the incomes in the whole labour market. The first one is constructed simply by pooling all (full-time) workers of a given country and historical period, and then calculating

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[48] Note that if a share is very low, like e.g. "child care workers and teachers' aides" in Germany, it does not necessarily mean that few persons are exercising this occupation. Many work only part-time hours and are thus not included here. The graph is only meant to illustrate the composition of the population observed here, not national labour-market structures as such.

their weighted average income decile. Building the anchor value for approach 2 is a little more complicated. As already mentioned above, it requires an intermediary step: after selecting all (full-time) workers of a given country and historical period, we first calculate the weighted average income decile of each occupation. After this, we calculate the average income decile across occupations (each with the same weight) for each country and historical period.

Implementing the mentioned intermediary step for approach 2, we confront the problem that the sample does not contain observations for every occupational group in every country in every year. This is an issue because we should compare the same set of occupations between countries: the occupations not observed in a country could tend to feature below- or above-average income positions; it would lead to biased results if we ignored these occupations in some countries but not in others. Across our whole sample of full-time workers out of 24 countries and nine years of observation, we can distinguish 180 occupational categories (ISCO, third level) in the data. In theory, our dataset could thus contain as many as 38.880 combinations (occupational groups * countries * years). Yet we only observe 25.219 actual combinations in our dataset (thus 64.9% of the possible number).

We assume that a lack of observations in a specific country and year does not mean a real absence of an occupational group. More probably, it has to do with the sampling of the national surveys. They are not necessarily an exact mirror of the whole working population; in particular, smaller groups might not be included (because they are hard to find or for confidentiality reasons). In addition, the lack of data for some occupational groups can also be related to national coding standards. Usually, countries have their own classification systems of occupations, adapted to their national employment systems, which are then translated into ISCO for international use. However, there is not always a one-to-one relationship between coding positions of the national and the international classification, so we cannot expect to find observations for all ISCO positions in all countries.

Part of our solution is a step that we do anyway for our analysis (see below): we pool observations across several years. Workers of a specific occupation may not be sampled in an individual year, but they are more probably included in the EU-LFS at least in one out of several years of observation. Pooling across a longer period thus reduces the number of occupational groups without observations in some countries. We divide our time window of observation, which ranges from 2012 to 2020, into two periods: period one between 2012 and 2015 (four years) and period two between 2016 and 2020 (five years). This step of pooling raises the share of observed combinations from 64.9% to 70.4%.

A next step, which only refers to the calculation of the reference value of approach 2, is to drop occupational categories not filled for most countries. For the period from 2016 to 2020, we can distinguish observations belonging to 173 occupational groups. Eighty-nine of these groups are observed in all 24 countries of our sample. Another 11 occupational groups are observed in all but one country, 8 groups in 22 countries, and 3 groups in 21 countries. We opt for keeping all occupations in our sample that we observe in at least 21 sample countries in the period between 2016 and 2020. Out of the 173 occupational groups observed in period 2, we keep 120 and drop 53. This outcome means that the income reference value of approach 2 will not be informed by the incomes of all occupational groups, but instead by those represented in the employment systems of (almost) all sample countries and considered in (almost) all the national classification systems of our sample countries. A list of occupational groups (not) included in approach 2 can be found in Appendix table 3. The average income decile of occupations

dropped being approximately the same as that of the occupations kept, we can say that our reference value still represents the mean income of full-timers in the labour market as a whole.

At this point, we still have to deal with some missing values. To be precise, for each occupational group kept in the sample, there are four possible cases in each observed country: (1) No lack of data in the first place. (2) Pooling across years has solved the problem, we find observations for this occupation in both historical periods. (3) Pooling has led to observations in one period, but not in the other period (2012 and 2015 or 2016 to 2020). (4) No observations for this occupational group in either period.[49]

Cases 3 and 4 require another step, which consists of imputing income values. We proceed in the following way to deal with case 3. If in country A, we find observations for an occupation in period 2, but not in period 1, we assume that workers in this occupation earned the same in period 1 as they did in period 2. Empirically, we insert six lacking values into period 1 (and eight vice versa). In case 4, where we do not find workers of a given occupation in one, two, or three countries in either period, we insert an income that corresponds to the mean income position of that occupational group in the countries where the data is available. For example, we find observations for the group "Wood processing and papermaking plant operators" in 21 countries but not in Cyprus, Ireland, and the United Kingdom. We assume that such workers exist also in these three countries but have not been sampled for some reason. We further assume that they feature an income decile that corresponds to the average of what this occupational group earn in the 21 other countries of the sample (in the same period). This may not be correct, but it is the best assumption we can make in the absence of data.

As a result of this procedure, we obtain a dataset with income information for each selected occupational group in every country in each period. This income information allows us to calculate the mean income decile across all (widespread) occupations that we need as a reference value to implement our second approach (in which relative incomes reflect the monetary rewards to an occupation compared to the universe of all other occupations). In the first approach, relative incomes reflect the income position of the observed group within the social structure; in other words, against the backdrop of all occupations weighted by the number of workers. Here, we do not make any steps to impute values for unobserved occupations: the fact of being unobserved indicates that they are rather small groups that do not impact average incomes across all workers. In a weighted approach, their absence is thus not problematic. In the second approach, where every occupation counts the same, whether it is an important group in a country or not, there is much greater need for imputation.

Based on the data and the methodological reflections presented in this chapter, we will proceed to our empirical analysis in the next chapter.

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[49] Case 4 can apply in a maximum of three countries per occupational group, otherwise the occupational group would have been dropped, as explained above.

4 Analysis: do EHW workers occupy (un)favourable income positions?

Our descriptive income analysis uses a metric of relative incomes, referring to net monthly incomes of full-time workers of selected occupations in selected branches compared to the net monthly incomes of all full-time workers in the same country (for a detailed explanation, please refer to the preceding chapter). We mainly look at the five years between 2016 and 2020, pooling all respective observations we find in the EU-LFS data (see 3.2.3).

4.1 Incomes of EHW workers as one comprehensive group

If we look at all full-time workers in the 13 observed EHW occupations and the 24 observed countries together as one group, we find that they earn, on average, 1.04 times the average monthly net income of all full-time workers in the period from 2016 to 2020. In other words, their income is 4% higher than the average income of all workers with the same number of working hours, across all occupations, branches, qualification levels, etc. This result implies that full-time employees who are not in EHW occupations tend to have smaller incomes than the EHW employees; the differences prove statistically significant (t-test).[50]

Distinguishing by country, Graph 5 shows that in only two out of 24 observed countries, EHW workers earn around 10% *below* the average of full-time employees, while in nine countries they earn at least 10% *more*.[51] The highest relative incomes are found in Cyprus and Croatia: full-time employees in EHW occupations earn roughly 30% more than other full-time employees in these countries. In some other Southern and Eastern European countries, Spain, Hungary, Greece, Portugal, and Romania, they earn between 10% and 20% more. Also in Luxembourg and Austria, they earn relatively well with incomes 1.17 and 1.11 times, respectively, as high as all full-time employees' incomes. In contrast, we see a significant income disadvantage in Switzerland, where EHW workers earn only 89% of all workers' incomes and in Finland with 90%.

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[50] Here, we are at the micro-level of individual workers ("approach 1", see 3.2.1). It is thus the incomes of the larger occupational groups that have the bigger influence on average incomes. This applies both to the observed occupations (Table 4) and the complete set of occupations in the reference group.

[51] Please note that "10% more", "10 p.p. more", or "1.11 times the average income" all mean the same thing in this context.

Graph 5: Relative incomes of employees in EHW activities on average, by country, 2016–2020

Source: EU-LFS, own calculations. Weighted values. Averages across country-years with available data. Full-time employees only.
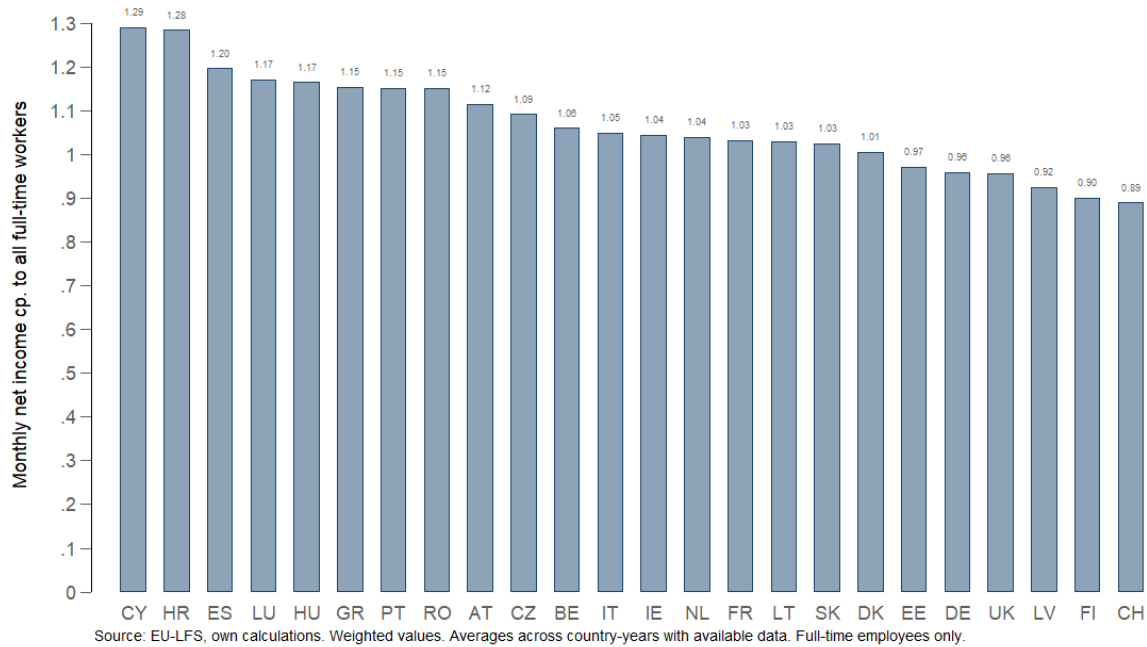
However, we should heed the differing structures of these countries' employment systems. This refers both to EHW workers (for example, medical doctors might constitute a bigger share of full-time EHW workers in one country than in another, see Appendix graph 1) and unequal structures of the rest of the employment system (the reference group of "all employees" may be dominated by low-paid occupations in one country, but not in another, see Graph 4 on page 33). To find out whether it is structural effects that drive our findings from above, we will abstract from the unequal number of persons working in the various occupations and compare them to the universe of all occupations (counting each occupation equally, no matter the number of members). The results are presented in Graph 6.

Graph 6: Relative incomes of EHW occupations on average, by country, 2016–2020

Source: EU-LFS, own calculations. Weighted values. Averages across country-years with available data. Full-time employees only.
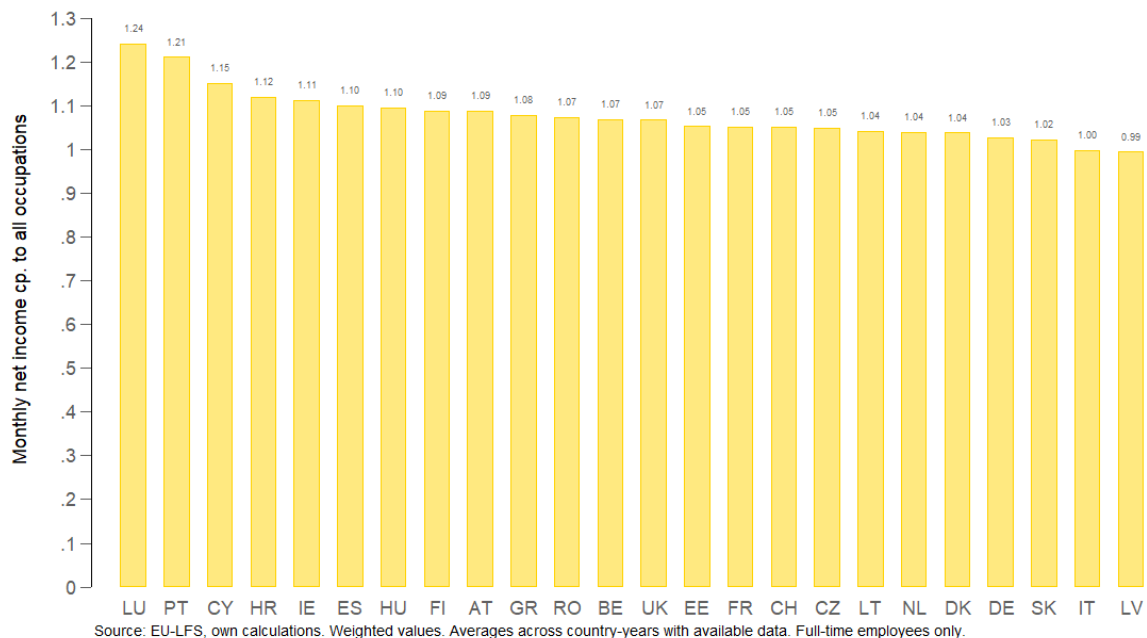
There are several aspects in which the meso-perspective of occupations (Graph 6) differs from the micro-perspective of workers (Graph 5). The first is that EHW *occupations* are not penalised in any observed country: they are either at a par with or above the average income of all occupations (i.e. they lead to incomes of at least 99% of the mean of all occupations). However, this result should not be over-interpreted because due to the equal weight of all occupational groups, also the relatively small occupational groups in the numerator can significantly influence the average. Second, the overall divergence between countries is a bit smaller in the occupational perspective, it spreads over 25 percentage points (p.p.), as opposed to 40 p.p. above. This shows that part of countries' income differences (as measured by approach 1) are not caused by differing rewards to occupations, but by structural differences. Third, the ranking order of countries is changed. Luxembourg is now first (note that in this country, we saw a particularly low share of employment in low-paid occupations in Graph 4), and Portugal is second. While the income advantages are significantly reduced in Croatia, Cyprus, and Hungary compared to above, EHW occupations remain quite well paid in these three countries. At the other end of the spectrum, Germany stays in one of the lower positions in terms of EHW occupations' incomes compared to all occupations in which persons could potentially work. The lowest relative incomes are observed in Latvia, Italy, and Slovakia, where our observed group of EHW occupations are rewarded not much differently from the average of all occupations.

In the literature, there is no consensus on whether care work is associated with a wage penalty or not. Lightman's (2021) recent study on a smaller, but global country sample in the time period 2010–2014 yields a 4% wage penalty for care work compared to non-care work (ibid., 987). Our results rather confirm findings from older research that "care work is not systematically associated with wage penalties" (Budig and Misra 2010, 459; see also Hirsch and Manzella 2015, 267). The different samples can explain the different results because Lightman only includes "lower-status caring occupations" (Lightman 2021, 978 see 991 for details), excluding highly skilled like doctors or university professors. With regard to cross-national differences, Lightman (2021) distinguishes by regime type and finds the largest penalty in countries with corporatist regimes (AT, DE, FR) and some penalty in countries with liberal (AU CA CH US) and with social democratic (DK NL) regimes. No significant differences between care work and non-care work wages are found by Lightman in countries of the familialistic regime type (ES GR IT). Our findings chime with that to some degree, as we also find care workers to have better income positions in the latter countries of Southern Europe. We suggest that part of this is due to the labour market structure, with these countries featuring fewer highly paid non-care jobs than other countries. Our findings also confirm that Germany, Switzerland, the United Kingdom, and Denmark are among the countries where care work is relatively less rewarded than elsewhere, though in our case, the cause is the absence of a wage premium rather than a wage penalty.

Of course, our above findings cannot be generalised to individual EHW workers and not even to specific occupations in this area. As we aggregated all 13 observed occupational groups, inter-occupational income differences have been flattened in the above figures. We will look at occupations separately in the following. This approach also has the advantage of results not depending so much on the specific definition of EHW occupational groups that one might favour. Since EHW work is not an entirely clear-cut category, the above findings are of course sensitive to leaving one group out or taking another group in.

4.2   EHW workers' incomes by occupation, education, and gender

In this section, we will distinguish between occupational groups, education levels, and genders, while leaving country differences aside. This means that observations are pooled across all countries. Graph 7 presents the average relative income of each selected occupational group compared to the incomes of all full-time employees (approach 1). Below, we will provide details on the composition of each group (4.3). Here, we just seek to show that there is considerable income heterogeneity within EHW and highlight the occupations' place in a cross-country income hierarchy.

Medical doctors are the top earners among the observed occupations, earning 1.46 times what full-time employees earn on average. We can assume, however, that this is still understated, as 63% of doctors in the observed population are situated in the 10th earnings decile (of their respective country, cp. Appendix table 4). This top earnings decile has no upper limit, and thus also contains persons with very high incomes (outliers). We can thus conclude that the average medical doctor earns *at least* 46% more than the average full-time worker.[52]

Teaching staff in tertiary education follow on the second place on the income ladder, with an income factor of 1.37. Also here, real income can be underestimated, as 38.6% are in the top income decile. Another drawback is that we cannot distinguish between status groups, e.g. between full professors and assistant professors with the data at hand, instead we have a mixed group.

Graph 7: Relative incomes of EHW employees, by occupational group. 24 European countries, 2016–2020
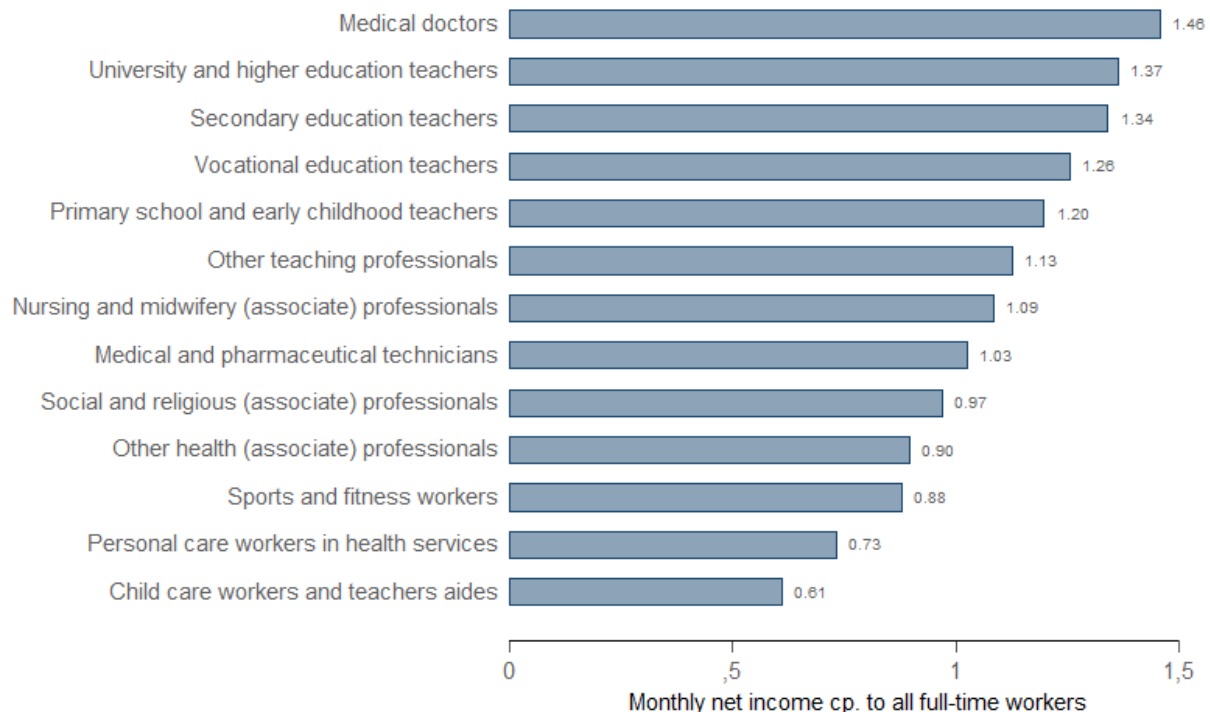
Source: EU-LFS, own calculations. Weighted values. Averages across 24 countries. Full-time employees only.

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[52] This is one of the major drawbacks of the information provided only as deciles in the data source. Mean incomes calculated from absolute amounts would take due account also of very high incomes. In the deciles metric, even extremely high incomes cannot do more than get the observation into the highest decile, thus in the category for the 10% of top earners.

Secondary, vocational, and primary school teachers earn significantly more than the average employee, across the 24 countries in our sample (but see the next section for between-country differences). Also, the group of "other teaching professionals"—teaching very specific subjects or particular groups of pupils (see Appendix table 5)—earn more than the average. Two groups in the education sector do not earn above-average incomes: "sports and fitness workers" with 88% and "child care workers and teachers' aides", who are at the very bottom of the distribution with only 61% of the average income (even though, also in this group, we observe only full-time employees).

Personal care workers in health services are slightly better off than those in education, with 73%. The remaining occupational groups are in the range of roughly plus or minus 10% of average incomes. This applies to most groups in the medical sector (apart from doctors and personal care workers) and to social and religious (associate) professionals.[53]

The above analysis thus exhibits wide income differentials—by 100 p.p. or even more—between occupational groups *within* fields of activity. For example, the field of education includes both the top-earning "university and higher education teachers" and the scarcely remunerated "child care workers and teachers' aides", just like medical doctors and personal care workers are both providing health services.

Comparing our results with the literature, Mueller (2018, 5) also states that "workers in lower-skilled health and social care assistant positions earn considerably less than the national average wage in their country." Hipp and Kelle (2016), based on a study of EU-LFS data, stress the importance of *qualification* as a predictor of income of care workers: in most European countries, education or health care workers performing assistant tasks (low-skilled) are paid below the national median wage. By contrast, professionals (high-skilled) in health care and education tend to earn more than the average worker in most countries (ibid., 250).[54] Our findings confirm this.[55] However, even if qualification is reflected in wages, this does not necessarily mean that skills are rewarded in the care sector as much as they are rewarded in other sectors: Budig, Hodges, and England (2019, 295) argue that the *above*-average skills and education levels of care workers are a reason why care workers do not earn *below*-average wages. (The same logic applies to tenure and working conditions.) The authors speak of a "positive selectivity" (ibid., 312) of persons into care occupations. We can thus assume that compositional differences may countervail and conceal a wage penalty exerted by care work. In addition, Barron and West (2013, 104) establish that in the British labour market, the size of the wage penalty of the care sector is more pronounced for the lower-qualified care workers as opposed to medicine and teaching.[56] Going beyond

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[53] Just like in section 4.1, we also tried out the alternative measurement approach 2, which gives the same weight to all occupations in the reference group, no matter the number of workers. Results are very similar this time (cp. Appendix graph 3) because EHW workers' occupational composition does not play a role in the numerator here, as there is only one occupation in the numerator. Moreover, it is in particular the comparison between countries where structural differences play out.

[54] This finding also holds when controlling for composition effects (Hipp and Kelle 2016, 532), as workers differ across sectors according to gender, age, family status, education, and other personal and work-related aspects (ibid., 247 et seq.).

[55] Hipp and Kelle (2016) compare income deciles without heeding the part-time issue explained in section 3.3.1. This, however, does not bias their comparison of high- and low-qualified staff *within* countries.

[56] The existence of a wage penalty in the United States has already been shown in an often-cited study by England, Budig, and Folbre (2002), who find that US workers experience a wage loss when they enter a care occupation and a wage increase when they leave a care occupation. England, Budig, and Folbre's (2002) longitudinal design has the virtue of holding workers' personal features constant and thus controlling for composition effects.

the formal criterion of qualification, Lillemeier (2017) compares workers' pay with regard to the actual requirements in their jobs.[57] A comparison between occupations with identical requirement levels shows that in Germany skilled workers in care jobs are underpaid, and unskilled care workers are even dramatically underpaid, as they also face high requirements.

Graph 5 distinguishes EHW workers by their education level (occupations are now mixed). The finding for our sample of 24 European countries and our more recent period of observation partly chimes with the afore-mentioned studies: persons with tertiary education degrees, trained at (applied) universities, earn similar incomes, whether or not they work in EHW. In both cases, average incomes are 20% above the average full-time workers' incomes (all education levels). However, among employees with upper secondary education levels, those in EHW take home incomes of only 85% of the average full-time worker, while those in non-EHW jobs earn 94%. The gap amounts to 9 p.p. Among employees with low schooling degrees, the gap is even wider: EHW employees take home incomes of only 58% of what the average full-time worker earns, while low-qualified non-care workers earn 78%. Our findings thus confirm that a wage penalty of EHW work exists for low-qualified workers; the lower the qualification (which does not necessarily imply easy *tasks*), the more severe the wage penalty.[58]

Graph 8: Relative incomes of EHW and non-EHW employees, by level of education. Average across 24 European countries, 2016–2020
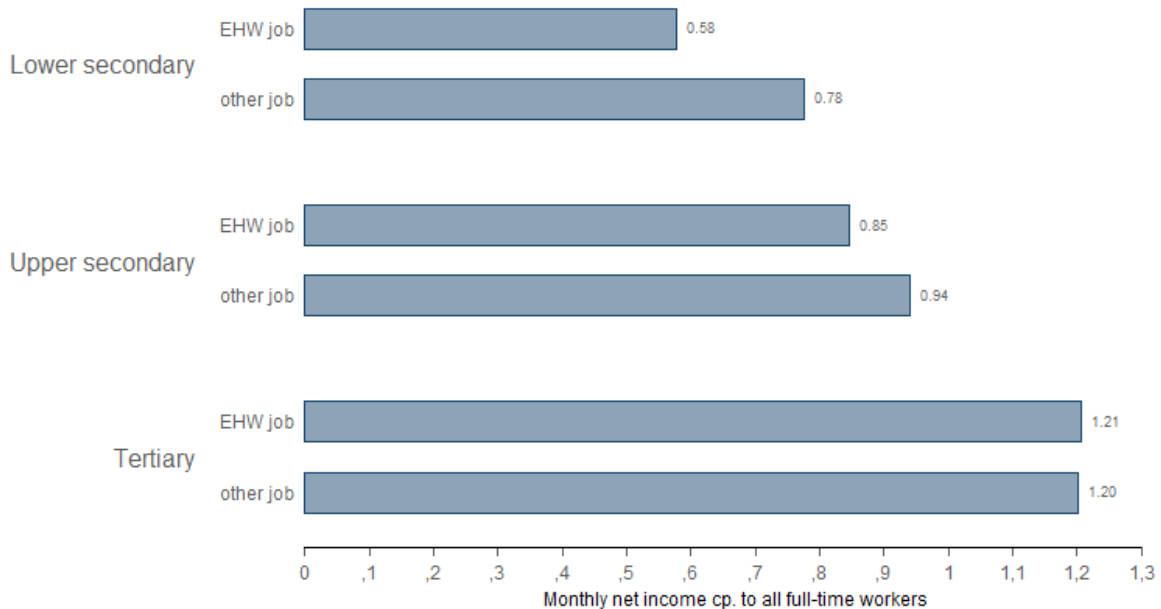
Source EU-LFS, own calculations. Note: Weighted values. Full-time workers only. Countries: AT BE CH CY CZ DE DK EE ES FI FR GR HR HU IE IT LT LU LV NL PT RO SK UK.

Knowing that wage penalties in the labour market often affect women, we should test whether the income gap between EHW and non-EHW jobs has to do with the prevalence of female workers in EHW jobs. Table 5 presents the figures. There are several insights. First, looking at the right column, which includes all education levels, women observed in EHW jobs earn *more* than women observed in non-EHW jobs

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[57] Measured by an index based on four components: knowledge, responsibility, psycho-social and physical demands.

[58] Of course, this is not a ceteris paribus assertion, e.g. because of the differing occupational composition.

(1.00 vs. 0.91). The same applies to men. This can be due to a higher qualification level of workers in EHW. Distinguishing by level of education, we still find a slight wage premium for EHW employees in the university-educated group. However, for men with upper- and lower-secondary education, a certain wage *penalty* of EHW work is visible compared to non-EHW work (amounting to -7 p.p. and -15 p.p., respectively). Among female workers, this penalty applies only for the lower-secondary education group, and the income disadvantage is a bit smaller (-9 p.p.).[59]

Table 5: Relative incomes of EHW and non-EHW employees, by education level and gender. Average across 24 European countries, 2016–2020

	Sex	**Lower secondary**	**Upper secondary**	**Tertiary**	**Total**
All occupations	both	0.77	0.94	1.21	1.00
	male	0.83	1.00	1.27	1.05
	female	0.64	0.83	1.14	0.93
	Gap (p.p.)	0.19	0.17	0.13	0.12
EHW occupations	both	0.58	0.85	1.21	1.04
	male	0.68	0.93	1.29	1.17
	female	0.56	0.83	1.17	1.00
	Gap (p.p.)	0.12	0.10	0.12	0.17
Other occupations	both	0.78	0.94	1.20	0.99
	male	0.83	1.00	1.26	1.04
	female	0.65	0.83	1.12	0.91
	Gap (p.p.)	0.18	0.17	0.14	0.13

Source EU-LFS, own calculations. Note: Weighted values. Full-time workers only. Countries: AT BE CH CY CZ DE DK EE ES FI FR GR HR HU IE IT LT LU LV NL PT RO SK UK.

Apart from the question of a wage penalty for EHW work, we can see in Table 5 that men earn more than women also *within* the EHW sector. If we compare all men and women in EHW occupations, men incur 1.17 times the average income, and women take home almost exactly the average income of full-time workers, no more, no less. Focussing on high-qualified EHW workers, men earn 29% more than the average and women "only" 17% more, which corresponds to a gender earnings gap of 12 p.p. A gap of similar size also exists in the two lower-qualified groups. The fact that the gender earnings gap across all education levels (17 p.p.) is bigger than the gap at each individual education level (10 to 12 p.p.) can be explained by an unequal distribution of women and men across education; women are overrepresented in the lower-qualified group. With regard to non-EHW jobs, the opposite is the case: the overall gender earnings gap is smaller than the gap within the three educational groups. Also note that at each level of education the gender income gap is more pronounced in the non-EWH domain than in EHW, which can be explained by the more equality-oriented wage setting in the public service sector, where EHW jobs are often located.

Of course, as is widely known, the gender wage gap partly has to do with occupational composition. Also within EHW, women may favour different occupations than men, possibly occupations with smaller monetary rewards. In the next section, we will take a closer look at the composition of our observed population, especially with regard to gender and education.

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[59] Women with upper secondary education earn only 83% of the average full-timers' income also *outside* of EHW, while men's incomes are on par with the average.

4.3   The composition of EHW occupational groups

As we argued in the previous section, income differences between occupational groups can be connected to—and in some cases also justified by—workers' compositional differences. Some individual features of the workers in our observed population and their job properties are presented in Table 6, and will be discussed in the following. We mainly distinguish between EHW and non-EHW workers, but also look at individual occupational groups within EHW.[60]

Looking at personal features, we see that full-time employees in EHW activities are very often female (Graph 9), while the overall share of women among full-time employees is 40.4%, more than three-quarters of EHW workers are women. By far the highest share of females is among "child care workers and teachers' aides" at 92.5%. "Primary school and early childhood teachers" and "personal care workers in health services" are predominantly female, too (86.1% and 83.4%). There are only three among the observed 13 occupational groups where men are the majority: "vocational education teachers" (47.8% women), "university and higher education teachers" (40.1% women), and "sports and fitness workers" (37.9% women).

Graph 9: Gender composition, by occupational group, 24 countries, 2016–2020 (pooled)
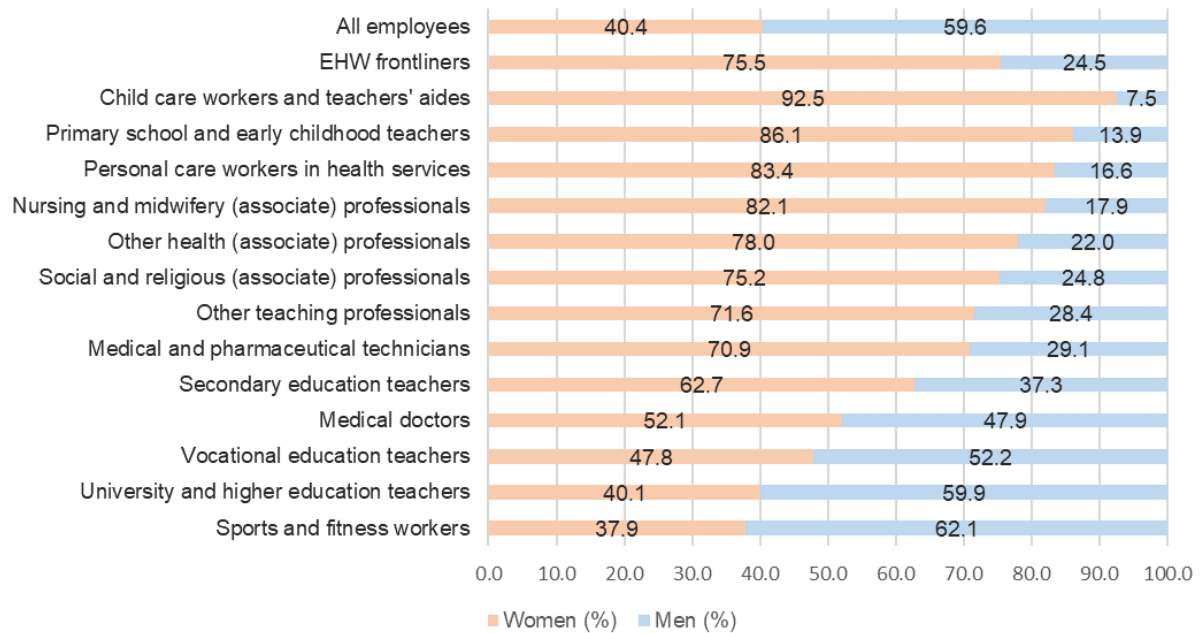
Source EU-LFS, own calculations. Note: Weighted values. Full-time workers only. Countries: AT BE CH CY CZ DE DK EE ES FI FR GR HR HU IE IT LT LU LV NL PT RO SK UK.

"Sports and fitness workers" are also the youngest observed group with a mean age of 38.2 years. The oldest group are "vocational education teachers" (46.6 years). EHW employees in general are, on average, slightly older than all full-time employees (42.1 years compared to 41.4 years).

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[60] It is important to keep in mind that we are exclusively looking at dependent employees working between 35 and 44 hours weekly. Workers with shorter or longer hours, or who are self-employed, may be different from our observed population. The figures cannot be generalised to all workers in the employment system, even though we will, for the sake of convenience, discuss "all workers" or "EHW workers" by which we refer exclusively to our observed population.

As far as education is concerned, we find a stunningly high share of EHW workers with a tertiary education degree: 59.4%, compared to just 34.4% among all employees. Only 6.7% of EHW workers have not more than a lower-secondary degree (but 16.9% among all employees). Yet there is important heterogeneity between EHW occupations: the highest shares of persons with tertiary education are among "university and higher education teachers" (98.3%), secondary education teachers (97.9%), and medical doctors (97.9%). By contrast, "child care workers and teachers' aides" and "personal care workers in health services" are the groups with the lowest shares of third level degrees among EHW occupations. In addition, 17.6% of the former and 21.8% of the latter only have a lower-secondary degree (the corresponding share is below 10% in all other groups, usually far below).

Graph 10: Educational composition, by occupational group, 24 countries, 2016–2020 (pooled)
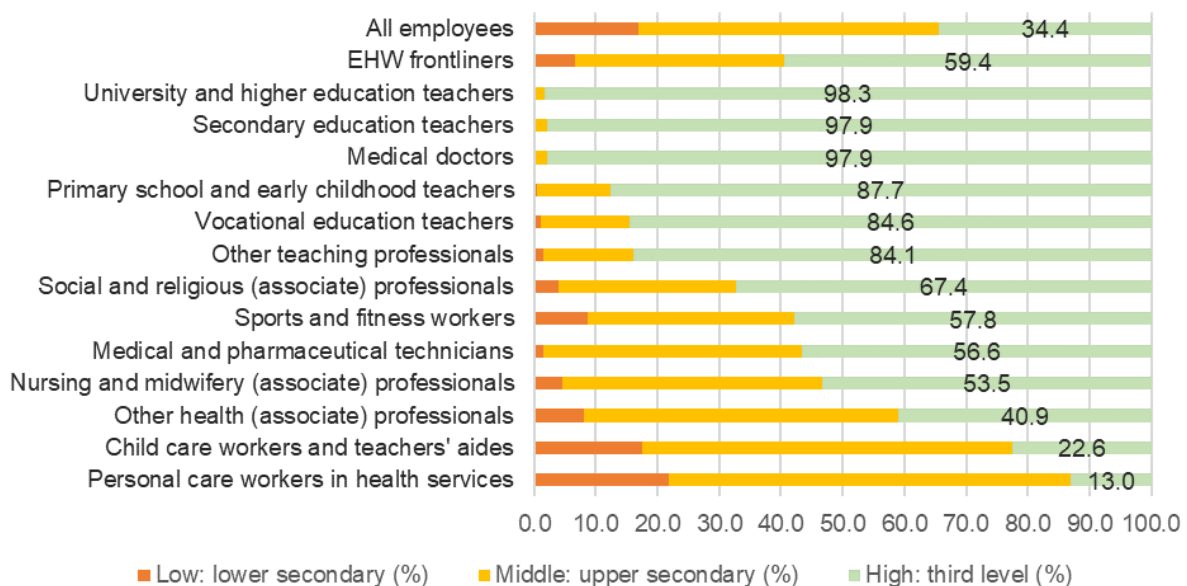

Source EU-LFS, own calculations. Note: Weighted values. Full-time workers only. Countries: AT BE CH CY CZ DE DK EE ES FI FR GR HR HU IE IT LT LU LV NL PT RO SK UK.

As for migration background, while among all full-time employees 86.6% are born in the country where they work, the share is slightly higher among full-time EHW workers, 88.4% are native workers. The share is highest among the "primary school and early childhood teachers", where 96.0% are natives and just 4.0% have come from abroad. The secondary education teachers are also very often natives (94.0%). The two groups with the highest share of foreign-born workers are in the health sector: "personal care workers in health services" (79.8% natives, 20.2% immigrants) and medical doctors (82.0% natives, 18.0% immigrants). Among "university and higher education teachers", too, there are many from other countries (84.2% natives, 15.8% immigrants). This result shows that some EHW services, particularly at the two ends of the occupational prestige spectrum, are disproportionately provided by foreigners in the European countries observed here.

While full-time working migrants have been staying in the country on average for 18.9 years, those who work as medical doctors have only been staying for 14.8 years on average. Also, for the other occupational groups with a strong migrant share, the duration of stay tends to be shorter than on average across migrants. This can mean that there is a lot of ongoing fluctuation, maybe for university staff, or that European countries have attracted a growing number of EHW workers from abroad in recent years.

As regards working time, we can see in Table 6 that more employees in EHW occupations "usually" or "sometimes" work on weekends than employees in general (31.7% vs. 21.7%), which can easily be explained by the interpersonal logic of their work. The same applies to night or shift work, which 29.2% of EHW workers at least sometimes do. This concerns above all "nursing and midwifery (associate) professionals" and "personal care workers in health services". Among the full-time workers in these groups, 53.9% respectively 57.4% say that they sometimes or even often work on weekends, and 62.2% respectively 55.1% sometimes or often do night or shift work. Both often applies also to medical doctors and "medical and pharmaceutical technicians". By contrast, only 7.0% of "child care workers and teachers' aides" say they work on weekends since children are obviously with their families, and preparations for the next week do not play the same role as for other kinds of teachers. The burden of night or shift work appears rather small on teachers in general.

Among EHW employees, 19.3% have supervisory positions, which is a bit less than for full-time employees general (22.1%). They are more often in temporary employment (14.2% vs. 12.0%) but less often in temp agency contracts (0.6% vs. 2.1%). The persons we observe have been staying with their current employer for 11.4 years on average at the time of the interview, which is more than the 10.4 years of workers in all occupations.

Some groups of EHW workers often oversee other workers, in particular the high-status groups of medical doctors (43.8%) and "university and higher education teachers" (32.3%). By contrast, "child care workers and teachers' aides" (8.0%) and "personal care workers in health services" (7.9%) do not often have supervisory functions.

Relatively high shares of temporary employment are found for "university and higher education teachers" and "sports and fitness workers" (21.3% and 21.2%, respectively). Among "primary school and early childhood teachers" and "secondary education teachers", fixed-term contracts are much lower at 8.0% and 8.2%, respectively.

Temp agency work concerns only 1.0% of "personal care workers in health services", but at the same time, this is the maximum among EHW occupational groups. "Nursing and midwifery (associate) professionals" are close with 0.8%. Among primary and secondary school teachers and "sports and fitness workers", temp agency work is almost irrelevant, concerning 0.3% of full-time workers or less.

Tenure with the same employer features a distribution that is approximatively the inverse to temporary and temp agency work. Average tenure is longest for primary and secondary school teachers (14.4 years resp. 15.1 years). The state of being a civil servant, common for teachers in many countries,[61] certainly also plays a role. Tenure is shorter for "personal care workers in health services" (9.2%) and "child care workers and teachers' aides" (9.1%). For these two groups, adverse working conditions coupled with usually favourable local labour markets can fuel inter-employer mobility. This also holds for "other health (associate) professionals" and "social and religious (associate) professionals" who feature an average tenure with the same employer of "only" 8.8 years on average. Yet tenure is shortest for "sports and fitness workers" 8.3%, who feature—as just seen above—almost no temporary agency work, but a high incidence of temporary employment (21.2%). This group is also the youngest among the observed groups, thus the chance for having stayed long with the same employer (at the time of data collection) tends to be smaller.

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[61] https://www.eupan.eu/wp-content/uploads/2020/05/Report-The-Civil-Service-System-at-European-Level.pdf

Table 6: Personal and job-related features of full-time employees in EHW activities, by occupation. 24 countries, 2016–2020 (pooled)

		All employees	All EHW employees	child care workers and teachers' aides	primary school and early childhood	secondary education teachers	vocational education teachers	university and higher education	sports and fitness workers	other teaching professionals	medical doctors	nursing and midwifery	personal care workers in health	medical and pharmaceutical	other health (associate)	social and religious (associate)
Gender (% female)		40.4	75.5	92.5	86.1	62.7	47.8	40.1	37.9	71.6	52.1	82.1	83.4	70.9	78.0	75.2
Age (years)		41.4	42.1	41.1	43.0	44.9	46.6	44.5	38.2	43.7	43.7	41.0	43.6	41.7	37.3	39.9
Education (%)	Low: Lower secondary	16.9	6.7	17.6	0.5	0.2	1.1	0.1	8.7	1.6	0.1	4.6	21.8	1.6	8.0	4.0
	middle: upper secondary	48.7	33.8	59.8	11.8	1.9	14.3	1.6	33.5	14.4	2.0	42.0	65.2	41.8	51.1	28.7
	High: Third level	34.4	59.4	22.6	87.7	97.9	84.6	98.3	57.8	84.1	97.9	53.5	13.0	56.6	40.9	67.4
Origin	Born in country (or unknown) (%)	86.6	88.4	88.0	96.0	94.0	93.4	84.2	87.2	92.0	82.0	87.4	79.8	91.7	90.0	90.8
	Immigrant (%)	13.4	11.6	12.0	4.0	6.0	6.6	15.8	12.8	8.0	18.0	12.6	20.2	8.3	10.0	9.2
	Immigrated # of years ago	18.9	19.4	21.8	25.7	27.1	26.6	16.5	16.7	20.6	14.8	19.4	17.4	21.8	18.7	21.6
Weekend work (% yes)		21.7	31.7	7.0	14.0	24.8	15.5	16.8	26.7	15.5	31.4	53.9	57.4	27.8	16.4	15.7
Night or shift work (% yes)		20.1	29.2	9.2	3.9	1.6	2.3	2.3	8.6	7.4	40.7	62.2	55.1	33.8	17.6	13.8
Supervisory position (% yes)		22.1	19.3	8.0	13.7	15.5	21.6	32.3	25.5	25.8	43.8	24.4	7.9	14.3	18.7	23.5
Temporary employment (% yes)		12	14.2	14.5	8.0	8.2	11.0	21.3	21.2	10.8	20.3	12.9	16.5	13.6	14.5	17.5
Temp agency work (% yes)		2.1	0.6	0.7	0.3	0.2	0.3	0.7	0.2	0.4	0.6	0.8	1.0	0.7	0.6	0.6
Tenure with same employer (years)		10.4	11.4	9.1	14.4	15.1	12.6	12.6	8.3	11.3	11.3	12.4	9.2	13.2	8.8	8.8
Size of firm (%)	1–10 persons	17.2	11.9	31.2	14.1	1.9	6.0	1.7	21.5	10.2	6.5	4.9	14.5	10.0	27.2	14.4
	11 to 19 persons	10.7	10.8	16.9	20.9	6.4	6.0	2.3	11.3	13.3	4.5	5.1	7.9	7.6	15.0	20.9
	20 to 49 persons	15.8	19.5	23.5	36.6	25.3	19.6	7.6	20.1	27.5	9.4	12.7	20.2	11.3	13.2	21.8
	50 persons or more	56.2	57.8	28.4	28.4	66.5	68.4	88.4	47.1	49.0	79.5	77.3	57.5	71.1	44.7	43.0
Degree of urbanisation (%)	Cities (densely populated area)	41.9	45.7	45.0	40.7	47.7	43.8	70.2	48.5	46.2	65.0	42.5	41.0	48.3	43.5	45.3
	Towns and suburbs (intermediate)	34.4	32.7	30.1	33.0	32.5	32.8	20.4	29.6	33.6	25.7	35.5	32.1	32.1	35.2	31.8
	Rural area (thinly populated area)	23.8	21.7	24.5	25.7	19.3	23.1	9.4	22.5	20.0	9.3	21.7	26.9	18.9	21.0	22.3

Source: EU-LFS, own calculations. Note: Weighted values. Countries: AT BE CH CY CZ DE DK EE ES FI FR GR HR HU IE IT LT LU LV NL PT RO SK UK.

Looking at the context in which jobs are embedded, the *size* of the firm or organisation in which occupations are usually exercised tends to be bigger among EHW employees than among all employees. In particular, the share of EHW workers in organisations with only 1 to 10 workers is quite small at 11.9% compared to 17.2% among all employees. However, almost one-third of "child care workers and teachers' aides" work in such small firms (32.1%), and more than a quarter of the "other health (associate) professionals" (26.4%)—dentists, pharmacists, physiotherapist (cp. Appendix table 5). Medium-sized organisations are where "primary school and early childhood teachers" predominantly work: 20.8% of them work under one roof with 11 to 19 persons and another 36.1% with 20 to 49 persons. Large organisations, counting 50 persons or more, employ the majority of the "university and higher education teachers" (88.9%), medical doctors (79.8%), "nursing and midwifery (associate) professionals" (78.2%) and medical and pharmaceutical technicians (71.7).

Among all full-time employees, 41.9% work in densely populated areas (cities), 34.1% in intermediate areas, and 23.9% in thinly populated (rural) areas. EHW activities are more often exercised in cities (45.7%) and less often in rural areas (21.7%). The highest shares of EHW employees working in densely populated areas are observed among "university and higher education teachers" (70.3%) and medical doctors (64.8%). These professions are clearly underrepresented in towns and suburbs as well as in rural areas. Occupations that are more frequent in towns and suburbs are "nursing and midwifery (associate) professionals" (35.5%) and "other health (associate) professionals" (35.2%). In rural areas, there are comparatively high shares of "child care workers and teachers' aides" (25.2%), "primary school and early childhood teachers" (26.3%), and "personal care workers in health services" (27.5%). This result is because many families are still based in rural areas, with some of the working-age adults commuting to the city for work.

A few of the differences we found by looking at individual and job features could explain the higher earnings of some groups of EHW employees compared to all employees: in particular, high educational degrees can justify higher earnings. But also, inconvenient working times (weekend, night, and shift work) and the fact of working more in large organisations and densely populated areas (with their higher cost of living) can play a role. A factor that could weigh negatively on EHW workers' incomes is their high share of females, given that women still often experience wage discrimination both individually and as occupational groups (Eurofound and JRC 2021).

4.4   EHW workers' incomes by occupation and country

In this section, we cross the occupational and the country perspective, looking at income positions of specific occupational groups in specific countries. We will discuss each group in turn, starting with educational occupations, then those in health care, and then social workers.

4.4.1 Occupations in the field of education

We saw above that "*child care workers and teachers' aides*" take home the lowest incomes of all 13 observed occupational groups at around 61% of what full-time workers usually earn (cp. Graph 7 above and Table 7 below). However, there are significant differences between countries: relative incomes range

from a maximum of 87% of full-timers' income average in Czech Republic[62] to only 41% in Switzerland. Other countries where "child care workers and teachers' aides" earn relatively well are Slovakia and Romania with 82% and 81%, respectively, of average incomes; and countries with particularly low incomes include Croatia, Luxembourg, and Germany (44%, 45%, and 46%). There is no European country where child care workers reach average earnings (which would be 100%).

Primary school and early childhood teachers' incomes range between 1.49 times full-time workers' average incomes in Portugal and 0.92 times in Latvia. Luxembourg and Hungary also stand out positively, while low incomes are earned in Estonia and Finland. The range of incomes between countries is relatively large here.

Secondary education teachers earn up to 64% more than the average employee in Portugal, and we observe no country where this group does not earn above-average incomes. Following Portugal, the highest incomes are found in Cyprus (1.55) and Hungary (1.50). In Estonia and the United Kingdom, secondary education teachers earn "just" 16% more than the average full-time employee.

Vocational education teachers' incomes are below secondary education teachers', but a bit above primary education teachers' incomes on average across countries. Compared to other full-time workers, vocational education teachers earn best in Cyprus (1.65), Portugal (1.51), and Greece, Croatia and Hungary (1.48). The lowest relative incomes are observed in Denmark (1.03), where they have just-above average earnings, and Italy and Latvia (1.09). Once again, there is a wide range between countries.

University and higher education teachers are the occupational group with the highest average incomes in the educational field across countries, with up to 77% more than the average full-time employee in Portugal, and more in Croatia and Hungary at 69% and 55%, respectively. While they still earn more than average, their income advantage over other employees is smallest in Denmark (+16%). In Latvia and Romania, the income advantage is slightly bigger (+23%), but still comparatively low.

The heterogeneous group of "*other teaching professionals*" range below primary education teachers in terms of average incomes across countries, but still tend to earn more than average in most countries. Compared to all workers with a usual working time between 35 and 44 hours per week, they earn most in Portugal (1.40), Cyprus (1.39), and Croatia (1.34). In Greece, where educational staff usually earn good incomes, the incomes of "other teaching professionals" are the lowest across countries; they just earn 92% of average full-timers' incomes. Also, in Estonia and Denmark, they realise "only" average earnings.[63]

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[62] Note, however, that CZ has not delivered data for the years 2018 to 2020. Our figure is mainly based on the year 2017.

[63] Unlike the other groups, "*sports and fitness workers*" cannot be singled out because most of the time the case number is not sufficient for presentation, according to EU-LFS confidentiality rules.

Table 7: Income positions of EHW employees in the education sector compared to all employees, by occupational group and country, 2016-2020 (pooled)

	Child care workers and teachers' aides	Primary school/ early childhood teachers	Secondary education teachers	Vocational education teachers	University and higher education teachers	Other teaching professionals
AT	0.64	1.11	1.35	1.34	1.34	1.16
BE	0.69	1.07	1.18	1.19	1.35	1.13
CH	0.41	1.03	1.29	1.33	1.35	1.10
CY	0.61	1.30	1.55	1.65	1.51	1.39
CZ	0.87	1.08	1.25	1.32	1.28	1.17
DE	0.46	1.33	1.37	1.27	1.30	1.21
DK	0.72	1.05	1.27	1.03	1.16	1.04
EE	0.48	0.94	1.16	1.16	1.35	1.01
ES	0.70	1.34	1.47	1.41	1.50	1.11
FI	0.49	0.95	1.32	1.35	1.51	1.21
FR	0.58	1.22	1.35	1.22	1.45	1.15
GR	0.82	1.11	1.31	1.48	1.52	0.92
HR	0.44	1.32	1.45	1.48	1.69	1.34
HU	0.72	1.38	1.50	1.48	1.55	1.29
IE	0.72	1.08	1.18	1.31	1.27	1.04
IT	0.50	0.99	1.21	1.09	1.36	1.05
LT	0.64	1.10	1.17	1.13	1.23	1.06
LU	0.45	1.43	1.40	1.48	1.33	1.25
LV	0.49	0.92	1.14	1.10	1.25	1.07
NL	0.71	0.99	1.19	1.15	1.24	1.10
PT	0.55	1.49	1.64	1.51	1.77	1.40
RO	0.81	1.19	1.26	1.25	1.23	1.22
SK	0.82	1.12	1.25	1.09	1.41	1.16
UK	0.62	1.05	1.16	1.12	1.31	0.98
Total	*0.61*	*1.20*	*1.34*	*1.26*	*1.37*	*1.13*

Source: EU-LFS, own calculations. Note: Weighted values. Full-time workers only. Top/bottom three countries per column coloured in green/red.

In sum, most occupational groups in the field of education tend to earn above-average incomes. This result has to be considered against the backdrop of their educational investments. We saw in Table 6 that while just over one-third of all full-time workers have completed tertiary education, 87.7% of primary and 97.9% of secondary school teachers do as well as 84.6% of vocational education teachers. Evidently, this holds even more for university teachers. By contrast, only 22.6% of "child care workers and teachers' aides" have earned tertiary degrees, and 17.6% only possess a lower secondary schooling certificate. This group is thus an exception in the field of education, and incomes are also exceptionally low in many countries.

4.4.2 Occupations in the field of health

Medical doctors are the top income group among workers in EHW services. The average income of doctors can be as high as 1.72 times the mean earnings of full-time workers in Croatia, or 1.70 times in Portugal (Table 8 below). However, there are also countries where the income advantage is much smaller: in the Netherlands, medical doctors just earn 11% more than the average full-time workers.[64] Also, in France and Romania, they do not realise particularly high incomes.

We have merged the two groups of "*nursing and midwifery professionals*" and "*nursing and midwifery (associate) professionals*" because in some countries, we only find either one or the other category. This indicates that there are different national traditions of grading these tasks. Merging means that persons observed in the comprehensive group of "nursing and midwifery (associate) professionals" can feature different educational levels, by country. Incomes differ widely between countries, reaching 1.48 times the average worker's income in Portugal. Also, in Spain and Croatia, nurses and midwifes earn above 30% more than the average full-time worker. By contrast, they earn only 81% of the average worker in Switzerland and 87% in Germany.[65]

Personal care workers in health services take home modest incomes in most countries, they are the last but one group in the income hierarchy among the 13 groups we observe. In Greece (0.90), their net incomes are at least in proximity to average incomes. Austria (0.86) and Ireland (0.84) follow on second and third place.[66] By contrast, in Croatia (0.48) and Slovakia (0.52), personal care workers in health services earn just about half of what full-time workers earn on average. Also, in Portugal (0.58) and Germany (0.59), incomes are very modest in spite of the full-time working hours.

On average across countries, *medical and pharmaceutical technicians* earn monthly net incomes comparable to the average full-time worker. In Portugal (1.37), Luxembourg (1.34), and Cyprus (1.24), they earn significantly above average. Incomes are lowest in Czech Republic (0.91), the Netherlands (0.92), and Finland (0.93).

Also, in the case of other occupations in the field of health, we aggregated professionals and associate professionals to one group, which can increase the income span. On average across the different occupational sub-groups, "*other health (associate) professionals*" realise the highest relative earnings in Cyprus (1.20), Luxembourg (1.19), and Portugal (1.16). The lowest incomes by far are observed in Germany (0.74), followed by Switzerland (0.80) and Denmark (0.90).

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[64] In our sample, there are 562 medical doctors from the Netherlands, which is a sufficient case number for a reliable result.

[65] Our results confirm Mueller's (2018, 15) findings in that he asserts above-average earnings for nurses and midwives in many European countries, in particular Spain and Portugal. By contrast, unlike Mueller's, our figures point to significantly below-average earnings in Germany and Switzerland. While the data source is the same in both studies (EU-LFS), differences can be explained by how the methods of observation deal with part-time workers (we focus on full-timers and see section 0). Historical time is the year 2016 in Mueller's case, and 2016–2020 in ours.

[66] Next to Greece, Mueller (2018, 15) also highlights Czech Republic for comparably good incomes of assistants in health and elder care, but not Austria (while Ireland is not included in his sample).

Table 8: Income positions of EHW employees in the health sector compared to all full-time employees, by occupational group and country, 2016–2020 (pooled)

	Medical doctors	Nursing and midwifery (associate) professionals	Personal care workers in health services	Medical and pharmaceutical technicians	Other health (associate) professionals
AT	1.53	1.17	0.86	1.22	0.94
BE	1.36	1.15	0.76	1.07	1.13
CH	1.36	0.81	0.62	1.00	0.80
CY	1.55	1.20	0.76	1.24	1.20
CZ	1.45	1.04	0.80	0.91	1.11
DE	1.49	0.87	0.59	0.95	0.74
DK	1.33	1.07	0.76	0.96	0.90
EE	1.54	1.08	0.61	1.15	1.12
ES	1.55	1.38	0.79	0.97	1.00
FI	1.62	0.92	0.65	0.94	1.02
FR	1.27	1.20	0.83	1.07	0.94
GR	1.47	1.12	0.90	1.04	1.00
HR	1.72	1.31	0.48	1.15	1.12
HU	1.57	1.05	0.68	1.00	1.10
IE	1.36	1.11	0.84	1.13	1.14
IT	1.53	1.18	0.68	1.18	1.00
LT	1.35	1.08	0.75	1.12	0.99
LU	1.44	1.18	0.76	1.34	1.19
LV	1.36	0.99	0.63	1.13	1.16
NL	1.11	1.01	0.79	0.92	0.99
PT	1.70	1.48	0.58	1.37	1.12
RO	1.26	1.19	0.83	1.14	1.16
SK	1.53	1.04	0.52	1.11	1.06
UK	1.41	1.12	0.72	1.06	1.05
Total	*1.46*	*1.09*	*0.74*	*1.03*	*0.90*

Source: EU-LFS, own calculations. Note: Weighted values. Full-time workers only. Top/bottom three countries per column coloured in green/red.

Like the educational sector, health care also embraces professional groups with quite unequal income positions. Medical doctors earn almost twice the net monthly incomes of personal care workers, and this figure is still a conservative estimate (due to the 10th decile cap, see above). This difference has to be considered in the context of tertiary education levels of virtually all medical doctors (97.9%, cp. Table 6) compared to only 13.0% among personal care workers in health services. Furthermore, supervisory responsibilities are involved in the jobs of 43.8% of medical doctors but exercised by only 7.9% of personal care workers. Also quite different is the two groups' gender composition: medical doctors are almost at a gender balance (52.1% females), while 83.4% of personal care workers are women and only 16.6% men. If there is a commonality between these two contrasting occupational groups, it is the slightly above-average incidence of temporary employment and the fact that both medical doctors and personal care workers have a migration background more often than the average worker in the labour market (Table 6).

4.4.3 Social and religious workers—and a comment on labour market structures

Social and religious (associate) professionals are occupied with interpersonal services (though research activities also constitute a significant part of their tasks). Across countries, this aggregate group occupies a medium place in the income hierarchy of EHW occupations. In our country sample, we observe the highest incomes in Cyprus (1.37), Portugal (1.34), and Croatia (1.33) and the lowest in Lithuania (0.88), Switzerland (0.90), and Latvia (0.91).

As explained above in the methods part (3.3.2), the relative income of an occupational group can be judged in two ways: its workers' incomes are compared to all workers' incomes, or they are compared to the incomes of all occupations. The difference is simply that in the first case, occupational groups with many members have a greater impact on the mean income of the reference group, while in the second case, all occupations weigh the same. This difference can be relevant, as countries feature different labour market structures. Being a teacher in one country may grant a worker a favourable position in the social structure (1) either because teachers are particularly well paid there or (2) because the number of well-paid jobs in other, better-rewarded occupations is limited in that country. Thus, if a teacher has a better income position in country A than in country B, this can potentially be explained by the weakness of country A's economy.

The blue bars in Graph 11 represent the income of "social and religious (associate) professionals", as discussed above (Table 7), based on approach 1, whereas the yellow bars show the relative incomes of this group compared to all occupations (approach 2).

Graph 11: Income positions of social and religious (associate) professionals, by country. 2016–2020 (pooled)
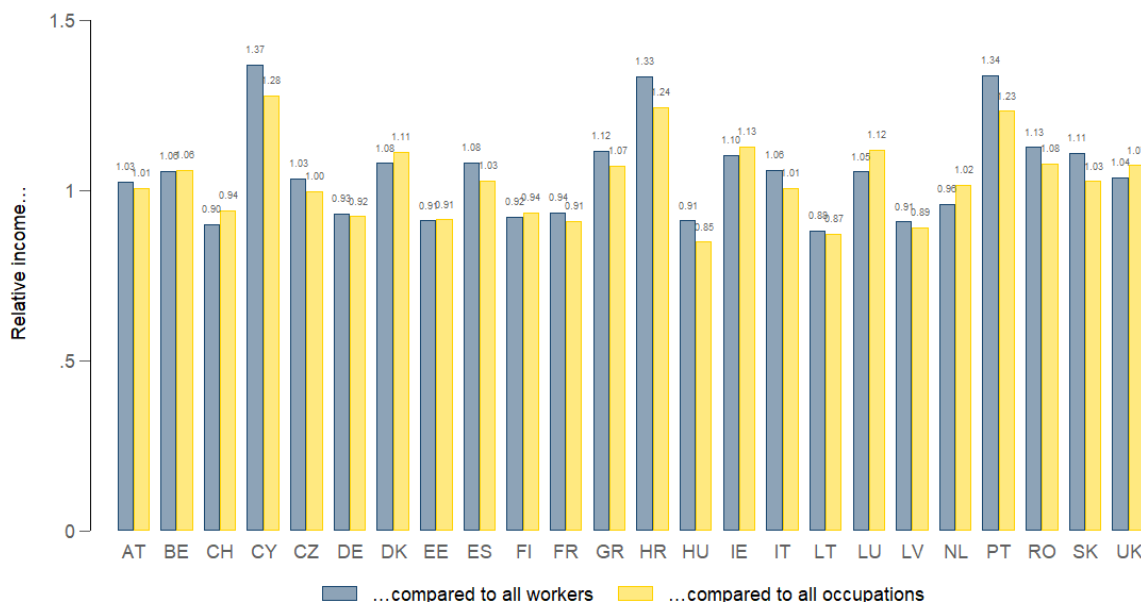
Source EU-LFS, own calculations. Weighted values. Full-time employees only.

This comparison could be done for all the occupational groups seen above, but the insight would always be the same: in high-income countries, like Switzerland, Denmark, Luxembourg, and the Netherlands, the relative income position of an EHW group is lower when compared to all workers than when

compared to all occupations. This is so because in these countries, some other occupations which usually yield superior incomes are exercised by more workers (cp. also Graph 4 above). The same logic holds in the United Kingdom, which is not like the mentioned small but wealthy countries, but which features a more bifurcated income structure, with many well-paid jobs at the top, e.g. in the financial industry.

In low-income countries (by European standards) like Cyprus, Croatia, or Portugal, highly paid non-EHW occupations also exist, but these jobs are not frequent enough to crowd out EHW workers from the upper earnings deciles. By contrast, more workers are in low-paid occupations (tourism, manufacturing) in these countries, earning less than many EHW workers and thus pushing up the latter in the national hierarchy of incomes.

4.5 Income trends: 2016–2020 compared to 2012–2015

Up to here, we have been analysing a recent historical period, pooling years between 2016 and 2020. In this subsection, we will compare this period with the status quo ante, the years from 2012 to 2015. This will cast some light on how the remuneration of EHW work evolved during the past decade. From the literature, we know that wages in "human health and social work activities" and education had increased between 2007 and 2011 in the EU (Fernández-Macías and Vacas-Soriano 2015, 55). The longer-term context, however, is marked by an increasing difficulty to finance person-oriented services, which Baumol (2.1.3) described as the "cost disease", which can—but does not have to—translate into pressure on wages. In the long run, between the early 1970s and 2008, Baumol (2012, 13) observes that medical professions' wages keep up with the evolution of consumer prices in the US economy, while the purchasing power of employees in the education sector goes down.

4.5.1 Trends by occupation

We will first look at trends by occupational group. Next to the relative income positions for the years 2016–2020, which we already know from above (4.2), Table 9 also shows average figures for 2012–2015. Occupations are sorted by the amount of change. We classify changes between minus 2.5 and plus 2.5 percentage points (p.p.) as examples of more or less stable income positions. In that sense, we observe an improvement only for "sports and fitness workers": they earned 84.5% of the average full-time worker in the period 2012–2015, and then 88.2% between 2016 and 2020, the difference being 3.7 p.p.

Among the five occupational groups with declining income positions, we find several health-related occupations: nursing and midwifery (associate) professionals (-2.1 p.p.), medical doctors (-3.6 p.p.), and at the bottom of the table "medical and pharmaceutical technicians" (-4.4 p.p.). Also, for "university and higher education teachers" (-2.7 p.p.) and "other teaching professionals" (-1.9 p.p.), relative incomes went down in the observed period. EHW workers' incomes as a whole shrank by 1.2 p.p. on average across all employees in the observed 24 European countries.

What we can also observe is a certain convergence among EHW occupations: the well-paid groups, i.e. doctors and university teachers, are among those who experienced the strongest decline of relative income among EHW occupations, whereas two groups with initially low and very low-income levels, i.e.

child care workers and "sports and fitness workers", saw their situation improve. (Notwithstanding, incomes of "personal care workers in health services" declined further from an initially low level.)[67]

Table 9: Trend of relative incomes of EHW compared to all employees, by occupational group (approach 1). Average across 24 European countries, 2016–2020 vs. 2012–2015

Occupational group	2012–2015	2016–2020	P.p. change	Trend
sports and fitness workers	0.845	0.882	3.7	Improvement
child care workers and teachers' aides	0.600	0.614	1.4	Stability
primary school and early childhood teachers	1.198	1.201	0.3	
other health (associate) professionals	0.896	0.899	0.3	
vocational education teachers	1.264	1.260	-0.4	
secondary education teachers	1.355	1.343	-1.2	
personal care workers in health services	0.749	0.735	-1.4	
social and religious (associate) professionals	0.990	0.973	-1.7	
other teaching professionals	1.148	1.129	-1.9	Decline
nursing and midwifery (associate) professionals	1.108	1.087	-2.1	
university and higher education teachers	1.394	1.367	-2.7	
medical doctors	1.497	1.461	-3.6	
medical and pharmaceutical technicians	1.073	1.029	-4.4	
Total	*1.057*	*1.045*	*-1.2*	

Source: EU-LFS, own calculations. Note: Full-time workers only. Weighted values. Sorted by percentage point change. Countries: AT BE CH CY CZ DE DK EE ES FI FR GR HR HU IE IT LT LU LV NL PT RO SK UK.

If we analyse income trends at the occupational level (approach 2, Table 10), we observe more stability. Across all EHW occupations, relative income shrunk by -0.3 p.p. only compared to all occupations. A decline, defined as a loss of 2.5 p.p. or more, is only observed for the group "medical and pharmaceutical technicians" (-3.4 p.p.). All other occupational groups are in the spectrum of stability; only "sports and fitness workers" improve their income position (+4.9 p.p.).

The phenomenon that EHW *occupations* have experienced more stable incomes than EHW *workers* can be explained by a trend where—in a period of relative stability of rewards to EHW occupations—(some) well-paid non-EHW occupations attracted more workers and/or (some) low-paid non-EHW occupations lost part of their workforce between the early and the late 2010s. This seems a plausible development in the context of discussions of SBTC (see 2.1.1). It could also be due to a fading out of the Eurocrisis, making the number of good jobs grow again in the private sector.

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[67] For the years before our observation period, 2007 to 2011, Fernández-Macías and Vacas-Soriano (2015, 55) find that wage inequality stayed constant in "human health and social work activities" and decreased slightly in the education sector. This approach is not directly comparable to ours, since the authors also include intra-occupational wage-inequality.

Table 10: Trend of relative incomes of EHW compared to all occupations (approach 2).
Average across 24 European countries, 2016–2020 vs. 2012–2015

Occupational group	2012-2015	2016-2020	P.p. change	Trend
sports and fitness workers	0.823	0.872	4.90	Improvement
child care workers and teachers' aides	0.586	0.605	1.90	Stability
other health (associate) professionals	0.872	0.885	1.30	
primary school and early childhood teachers	1.152	1.164	1.20	
vocational education teachers	1.236	1.243	0.70	
secondary education teachers	1.306	1.306	0.00	
social and religious (associate) professionals	0.970	0.963	-0.70	
other teaching professionals	1.121	1.113	-0.80	
personal care workers in health services	0.726	0.718	-0.80	
nursing and midwifery (associate) professionals	1.073	1.063	-1.00	
university and higher education teachers	1.354	1.341	-1.30	
medical doctors	1.444	1.422	-2.20	
medical and pharmaceutical technicians	1.038	1.004	-3.40	Decline
Total	*1.025*	*1.022*	*-0.30*	

Source: EU-LFS, own calculations. Note: Full-time workers only. Weighted values. Sorted by percentage point change.
Countries: AT BE CH CY CZ DE DK EE ES FI FR GR HR HU IE IT LT LU LV NL PT RO SK UK.

4.5.2 Trends by country

How have the rewards to EHW labour evolved in the observed countries in the last decade? The left half of Table 11 presents the trends according to the micro-level perspective of EHW workers' incomes compared to all full-time workers (approach 1). Income positions of EHW workers improved most in Hungary (+5.7 p.p.), Romania (+5.1 p.p.), Estonia (+4.3 p.p.), and Greece (+4.0 p.p.). Also, nine out of the 24 observed countries had a decline of more than 2.5 p.p. The decline is by far the strongest in Czech Republic (-16.4 p.p.), but it is also marked in Portugal (-7.5 p.p.), Croatia (-6.2. p.p.), and Cyprus (-5.5 p.p.). In these four latter countries, the initial level of EHW workers' incomes in 2012–2015 was higher than anywhere else among the countries observed, the downward move thus happens from a high initial level; consequently, EHW workers keep above-average income positions. The country with the most stable income positions in the decade after 2010 is Germany; here, the relationship between the incomes of full-time workers in EHW occupations and all full-timers' incomes has remained virtually unchanged (+0.1 p.p.).

Table 11: Trends of relative incomes of EHW employees and EHW occupations, by country

Approach 1: EHW workers					Approach 2: EHW occupations				
Country	2012-2015	2016-2020	P.p. change	Trend	Country	2012-2015	2016-2020	P.p. change	Trend
HU	1.108	1.165	5.7	Improvement	EE	0.905	0.974	6.9	Improvement
RO	1.101	1.152	5.1		HU	1.024	1.085	6.1	
EE	0.928	0.971	4.3		RO	1.048	1.103	5.5	
GR	1.114	1.154	4.0		LU	1.199	1.242	4.3	
LU	1.148	1.171	2.3	Stability	GR	1.077	1.110	3.3	
NL	1.030	1.039	0.9		SK	0.917	0.948	3.1	
DE	0.958	0.959	0.1		NL	1.084	1.101	1.7	Stability
ES	1.205	1.197	-0.8		DE	0.940	0.952	1.2	
SK	1.034	1.025	-0.9		AT	1.090	1.095	0.5	
FR	1.046	1.032	-1.4		FR	1.006	1.005	-0.1	
AT	1.130	1.115	-1.5		LV	0.909	0.906	-0.3	
LV	0.942	0.924	-1.8		FI	0.917	0.913	-0.4	
BE	1.078	1.060	-1.8		CH	0.938	0.931	-0.7	
FI	0.919	0.901	-1.8		IE	1.073	1.066	-0.7	
IE	1.067	1.044	-2.3		BE	1.073	1.063	-1.0	
IT	1.075	1.049	-2.6	Decline	UK	1.004	0.990	-1.4	
CH	0.917	0.890	-2.7		IT	1.014	0.996	-1.8	
UK	0.988	0.956	-3.2		ES	1.158	1.138	-2.0	
DK	1.043	1.006	-3.7		LT	1.044	1.020	-2.4	
LT	1.067	1.030	-3.7		DK	1.062	1.036	-2.6	Decline
CY	1.346	1.291	-5.5		PT	1.097	1.062	-3.5	
HR	1.347	1.285	-6.2		CY	1.247	1.204	-4.3	
PT	1.227	1.152	-7.5		HR	1.242	1.198	-4.4	
CZ	1.256	1.092	-16.4		CZ	1.180	1.053	-12.7	
Total	*1.057*	*1.045*	*-1.2*		*Total*	*1.025*	*1.022*	*-0.3*	

Source: EU-LFS, own calculations. Note: Full-time workers only. Weighted values. Sorted by percentage point change.

If we measure EHW incomes by approach 2, thus compared to all occupations, the order of countries is changed in some respects (right part of Table 11). Estonia is then the country where EHW occupations' income positions have improved more than in all other countries (+6.9 p.p.). The list of countries with improvements is longer; declines are less frequent than according to approach 1. Czech Republic is still the country with the least favourable development. For Germany, which is stable from the perspective of approach 1, we can assert that EHW occupations incurred income gains compared to other occupations, but (looking back to approach 1) these seem offset by structural change in the labour market in the 2010s.

4.5.3 Trends by occupation and country combined

The final step of the trend analysis is to disaggregate down to combinations of occupation and country. Where did our observed occupational groups experience declining, stable, or improving income positions between the first and the second half of the observation period? The results (for measurement approach 1) are presented in Table 12.[68]

The table again distinguishes between decline (-2.5 p.p. or less), stability, and improvement (+2.5 p.p. or more), and also highlights if trends are strong (more than +/- 5 p.p.) or very strong (more than +/- 10 p.p.). We take the example of Germany (highlighted in grey) to show how to read the table. The overall stability reported above for the German case (approach 1) applies also to most individual occupational groups in the EHW field. Their relative incomes stay approximately what they had been in the early 2010s. Yet "child care workers and teachers' aides" witnessed a certain decline of their income position: compared to all full-time workers, their incomes decreased by more than 2.5 percentage points (but by less than 5.0 p.p.) in Germany. The same holds for "other teaching professionals". By contrast, "personal care workers in health services" have gained a better income position, improving by at least 2.5 p.p. (but by less than 5 p.p.).

Overall, positions of EHW employees have declined in 127 cases and improved only in 63 cases (a "case" being one occupational group in one country). In particular, "university and higher education teachers" have not experienced improving incomes in any of the observed countries, but have experienced declines in 16 countries, and in seven countries by more than 10 p.p. Other occupational groups with (very) strong income declines in several countries are "other teaching professionals", medical doctors, "medical and pharmaceutical technicians", and "social and religious (associate) professionals".

By contrast, incomes of "child care workers and teachers' aides" have improved very strongly, thus by more than 10 p.p., in five countries in the observed timeframe: Romania, Latvia, Greece, Spain, and Hungary. In addition, they have strongly improved (by more than 5 p.p.) in Estonia and Ireland. There are also four other occupational groups—with rather average or below-average incomes—where income positions have improved strongly or very strongly in as many as four countries: "nursing and midwifery (associate) professionals", "personal care workers in health services", as well as "other teaching professionals" and "social and religious (associate) professionals". The latter two groups have thus experienced heterogeneous trends across countries.

The country with the largest number of occupational groups that experienced (very) strong declines of income positions is Czech Republic (9 groups) followed by the United Kingdom (7 groups). Positive or very positive developments are most frequent in Hungary (7 groups) and in Estonia and Greece (6 groups).

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[68] Of course, this kind of disaggregation shrinks the number of observations, especially in the smaller occupational groups and in the smaller countries. To ensure the reliability of our figures, we only report groups of at least 50 observations each in both periods 2012-2015 and 2016–2020. Of the 624 possible combinations of (24) countries, (13) occupational groups, and (2) periods, we have observations in our sample for 621 combinations. If we only keep groups with at least 50 observations, 571 remain. We also drop "sports and fitness workers", which leaves us with 560 combinations. The minimum number of observations among the country-occupation-period combinations is 50, the maximum 20316 observations. On average, groups count 1192 observations.

Table 12: Trend of relative incomes of EHW compared to all employees, by occupational group and country. 2016–2020 vs. 2012–2015 (approach 1)

Occupational group	Very strong decline (<= -10 p.p.)	Strong decline (<= -5 p.p.)	Decline (<= -2.5 p.p.)	Stability (> -2.5 p.p. to < 2.5 p.p.)	Improvement (>=2.5 p.p.)	Strong improvement (>= 5 p.p.)	Very strong improvement (>= 10 p.p.)
child care workers and teachers' aides	CZ	PT CH	SK DE NL IT	FR CY UK DK LV AT FI BE	–	EE IE	RO LT GR ES HU
primary school and early childhood teachers	–	CY CZ UK	PT DK HR	SK NL IT LT DE IE FR FI LV BE	LU CH AT GR ES	EE RO	HU
secondary education teachers	LT	FI IE LV IT UK	SK LU CZ FR AT HR BE CY	CH NL DK PT DE	GR RO ES	EE HU	–
vocational education teachers	LT	SK DK UK	FR LV	LU CH CZ RO FI EE AT IT DE NL BE	ES	–	HU HR GR
university and higher education teachers	CZ IE RO SK LV GR LT	CH EE UK CY	AT FR BE HU DK	PT FI HR DE NL ES IT	–	–	–
other teaching professionals	LT UK HR	PT FI IE	SK CZ AT NL DK IT DE	LV BE EE LU CH ES	–	HU CY GR	RO
medical doctors	SK CY LV CZ	FR DK LT RO	PT UK BE	AT HR FI EE IE NL GR DE IT ES	CH	HU	–
nursing and midwifery (associate) professionals	CZ	UK	PT FI IT CH BE CY FR	SK AT LT HR NL DE DK IE ES	RO HU	EE LV LU GR	–
personal care workers in health services	CZ HR	PT	CH NL FI BE ES CY	SK IE LT LV UK DK FR IT	AT LU DE	EE GR HU	RO
medical and pharmaceutical technicians	SK HR CY CZ	RO FR UK	DK IT AT IE	PT GR DE CH BE NL ES	FI LT HU	–	LV
other health (associate) professionals	CZ	AT HR	SK PT EE FI FR IT DK ES	IE LT DE UK CH GR RO	NL HU LV	BE	CY
social and religious (associate) professionals	CY CZ	AT IE DK FR CH	SK PT FI UK NL IT LV	EE LT BE DE ES	HU	HR RO LU	GR

Source: EU-LFS, own calculations. Note: Full-time workers only. Weighted values.

As already known from above, EHW income trends to look more positive according to our second measurement approach, the one at the level of occupations. We relegate these results to the appendix (Appendix table 6), as they are quite similar to what we see in Table 12. Usually, trends are classified in the same way, and they are slightly more positive. This changes the balance between negative and positive trends. All in all, we observe declining occupational incomes in 92 cases, and improvement in 89 cases, according to approach 2. This result again shows that it is mostly structural effects that have deteriorated the relative income position of full-time EHW workers in the observed period.

In the following subsection, we will conclude our descriptive analysis by sorting countries into groups.

4.6 EHW occupations' income patterns across countries

Are there specific patterns for how the incomes of different EHW occupations vary across countries? Are there groups of countries that remunerate EHW occupations similarly? We will explore these questions for the period 2016 to 2020, performing a clustering analysis and then describing the country clusters.

A cluster analysis approach is to group objects (here: countries) in a way that every group is as internally homogeneous as possible, while as different as possible from the other groups with regard to the relevant features (here: incomes of EHW workers/occupations). The methodological approach is to first use a hierarchical clustering method (Ward, Euclidean distance measure) to determine an appropriate number of country clusters (see dendrogram in the Appendix). The Elbow Criterion (Duda, Hart, and Stork 2001) yields a five-cluster respectively four-cluster, solution. An additional kmeans clustering analysis for a pre-set number of clusters refines the allocation of countries to clusters. In our case, it leads to the same grouping as the Ward method. The analysis is done for both ways of measuring relative income, i.e. approaches 1 and 2 (3.3.2).

Approach 1 leads to the cluster solution presented in Table 13. Clusters are built upon the relative incomes earned by EHW workers compared to other workers. They can be characterised as follows:

– Cluster A1 features relatively low incomes of EHW workers, in particular in the field of education. However, the two groups which are generally the least privileged earn better than they do at cross-country average (see first column): "child care workers and teachers' aides" earn 70% of the average full-time worker and "personal care workers in health services" earn 77% in this cluster. Another peculiarity of cluster A1 is the relatively small income advantage of medical doctors (only 1.35 compared to 1.45 across all countries). This cluster includes the following countries: Belgium, Czech Republic, Denmark, Ireland, Italy, the Netherlands, Romania, and the United Kingdom.

– In Cluster B1, there are particularly low incomes for "child care workers and teachers' aides" (0.45), for nurses and midwifes (0.87), and for "other health (associate) professionals" (0.85). In addition, "social and religious (associate) professionals" (0.92), "personal care workers in health services" (0.62), and "medical and pharmaceutical technicians" (0.96) earn less than they do at cross-country-average. The remaining groups, medical doctors and the various groups of teachers, earn approximately the same as they do across all 24 countries. The three countries that constitute this small third cluster are Switzerland, Germany, and Finland.

– Cluster C1 features income positions below the European average for most observed occupational groups, even though no group is particularly badly paid. The only positive exception is "sports and fitness workers" (1.13), who earn relatively well in this cluster. This cluster is mostly a Baltic cluster, gathering Estonia, Lithuania, and Latvia; Slovakia is in this cluster as well.

– Cluster D1 can be considered as the opposite of cluster A1: relative incomes of most EHW occupations are very good, i.e. better than in all other clusters. Exceptions are "child care workers and teachers' aides" (0.53) and "personal care workers in health services" (0.61), who are paid less than in (most) other countries. The fifth cluster is thus polarized at the disadvantage of the weaker income groups. It consists of Cyprus, Croatia, and Portugal.

– Cluster E1 grants slightly better incomes to our observed occupational groups than the mean of observed countries, with the exception of "sports and fitness workers". "Personal care workers in health services" are paid more than in any other cluster (they reach 0.80 times full-time workers' incomes on average across the countries in that cluster). Part of this cluster are Austria, Spain, France, Greece, Hungary, and Luxembourg.

Table 13: Country clusters and average relative incomes of EHW employees, by occupational group, 2016–2020 (approach 1)

Occupational group	All 24	Cluster A1	Cluster B1	Cluster C1	Cluster D1	Cluster E1
		BE CZ DK IE IT NL RO UK	CH DE FI	EE LT LV SK	CY HR PT	AT ES FR GR HU LU
child care workers and teachers' aides	0.62	0.70	0.45	0.61	0.53	0.65
primary school and early childhood teachers	1.15	1.06	1.10	1.02	1.37	1.26
secondary education teachers	1.31	1.21	1.33	1.18	1.55	1.40
vocational education teachers	1.29	1.18	1.32	1.12	1.55	1.40
university and higher education teachers	1.39	1.27	1.39	1.31	1.65	1.45
sports and fitness workers	0.90	0.79	1.03	1.13	0.88	0.84
other teaching professionals	1.15	1.09	1.17	1.07	1.38	1.15
medical doctors	1.45	1.35	1.49	1.44	1.66	1.47
nursing and midwifery (associate) professionals	1.11	1.11	0.87	1.05	1.33	1.18
personal care workers in health services	0.72	0.77	0.62	0.63	0.61	0.80
medical and pharmaceutical technicians	1.09	1.05	0.96	1.13	1.25	1.11
other health (associate) professionals	1.04	1.06	0.85	1.08	1.15	1.03
social and religious (associate) professionals	1.05	1.06	0.92	0.95	1.35	1.02

Source EU-LFS, own calculations. Note: Full-time workers only.

It should be noted that a cluster does not usually reflect the individual case of each of its member countries precisely. Instead, clusters reveal the overall structure of the data. One peculiarity of this structure seems to be the relationship between the incomes of "child care workers and teachers' aides" and "personal care workers in health services" compared to the rest of our occupational groups: in some countries, these two weak-income groups are paid a little better (cluster E1) or a little less (cluster C1) together with the other occupational groups. By contrast, in some countries, these two groups contrast with the rest of occupational groups, either by being better off than in most countries (cluster A1) or by featuring particularly low incomes while the other EHW occupational groups earn above the European average (cluster D1).

If we calculate income positions for all occupations (approach 2) and not with regard to all full-time workers (approach 1), we get a four-cluster solution similar to the one just described: cluster A1 corresponds to the new cluster A2, cluster B1 features similar qualities to the new cluster B2, etc. The countries of the former cluster A5 are reallocated to the other four new clusters, see Table 14. Countries that have joined a new cluster are highlighted in grey. Cluster A2 gains four new members (while losing Italy to Cluster C2).

The difference between the cluster solutions can again be interpreted as the difference between a pure hierarchy of rewards to occupations and a hierarchy between incomes of workers, which is informed both by occupational rewards and by the size of occupational groups. What this means for cluster A is that there are quite a number of countries where EHW work is generally paid less than in other countries (except that low-qualified care work is not penalised as strongly), but which feature labour market structures that grant EHW workers a decent relative income position nevertheless (which shows in the cluster solution presented above, see cluster E1).

Table 14: Country clusters and average relative incomes of EHW occupations, 2016–2020 (approach 2)

Occupational group	All 24	Cluster A2 AT BE CZ DK ES FR GR IE NL RO UK	Cluster B2 CH DE FI HU	Cluster C2 EE IT LT LV SK	Cluster D2 CY HR LU PT
child care workers and teachers' aides	0.61	0.71	0.51	0.56	0.49
primary school and early childhood teachers	1.13	1.11	1.16	0.98	1.33
secondary education teachers	1.29	1.26	1.36	1.15	1.45
vocational education teachers	1.27	1.25	1.35	1.08	1.47
university and higher education teachers	1.36	1.32	1.42	1.28	1.51
sports and fitness workers	0.88	0.77	1.03	1.04	0.85
other teaching professionals	1.13	1.09	1.20	1.04	1.29
medical doctors	1.42	1.36	1.50	1.41	1.54
nursing and midwifery (associate) professionals	1.09	1.13	0.91	1.04	1.24
personal care workers in health services	0.71	0.80	0.63	0.62	0.63
medical and pharmaceutical technicians	1.07	1.04	0.97	1.10	1.23
other health (associate) professionals	1.02	1.03	0.91	1.03	1.11
social and religious (associate) professionals	1.03	1.04	0.91	0.94	1.22

Source EU-LFS, own calculations. Note: Full-time workers only.

The case of Italy is special, the country switches from cluster A1 to C2: possibly, large non-EHW occupational groups are earning even below the low-qualified groups of EHW workers, such that the country is situated in cluster A1, where child care workers and personal care workers in health services have a better relative position than in other countries. As soon as sizes of occupational groups are set aside, Italy joins the cluster where almost all EHW occupations (except sports and fitness workers) are paid less than in other countries.

One further thing that we can take home from the clustering exercise is that similarities of countries regarding how EHW work is remunerated does *not* follow a strong regional logic. The clusters each contain countries of different regions in Europe. Furthermore, the cluster solution does not show a strong logic of "care regimes" (Lightman 2021, 978) or "worlds of welfare (Esping-Andersen 1990): corporatist/conservative regimes like Austria, France, and Germany do not all appear in the same cluster, neither do the familialistic/residual regimes Spain, Italy, and Greece. Only the social democratic regimes, Denmark and the Netherlands, appear in cluster A in both cluster solutions, which makes some sense because this is the cluster with the smaller wage penalty for the lowest-earning group. However, we would

not expect countries with corporatist or familialistic care regimes to appear in this cluster together with the social democratic ones. Also, national wealth does not seem to determine how countries are grouped, as high- and low-income countries are obviously mixed within the clusters.

5   Summary and conclusion

In this concluding chapter, we will first give an overview on our empirical results. After a discussion of the limitations of this study, the paper ends with an outlook on future labour-market trends.

5.1   Overview on the empirical findings

Our empirical analysis focussed on net monthly incomes of dependent employees (including civil servants), working in full-time (35 to 44 hours a week) in the EHW fields. Within these fields of activity, there are distinct occupational groups, dealing with different clients, e.g. concerning age and needs in the education sector, or exercising different tasks in the context of a division of labour, e.g. in a hospital. Just like their work differs, the EHW occupational groups' features also differ. For example, across the 24 countries observed, 92.5% of "child care workers and teachers' aides" are female, but only 40.1% of "university and higher education teachers" (Graph 9). Also, only 22.6% of the former, but 98.3% of the latter possess tertiary education degrees (Graph 10). Features of work contracts and properties of employer organisations also differ between occupational groups (Table 6). In spite of the heterogeneity, women and workers with high educational degrees are strongly overrepresented in the EHW group compared to the rest of the workers in the labour market.

Our approach to analysing incomes is to build a ratio between the average income decile of an observed group of workers and the mean income decile of all workers in the same country and historical period. This yields an income factor above or below unity. If we compare workers in EHW activities to workers in general, our first observation is that care work is not generally low-paid in Europe: full-time EHW workers earn even slightly above the average full-time worker, on average, in the years between 2016 and 2020. An important reason for this result is the mentioned high level of education that EHW workers tend to have: 59.4% of them feature tertiary education degrees, while only 34.4% of workers in general have studied at (applied) universities. We do find a wage penalty for EHW work, but not for highly educated workers—those with tertiary education earn similar incomes in EHW occupations compared to workers in non-EHW domains. For workers with only upper- or lower-secondary education, however, our findings suggest a wage penalty associated with EHW work: in the descriptive comparison, the gap amounts to 9 p.p. and 20 p.p., respectively. The latter means, concretely, that among the group of employees with low schooling degrees, those with care jobs take home incomes of 58% of what the average full-time worker earns, while those with other jobs earn 78% of the average full-time worker in the whole labour market (Table 5). This gap is more pronounced for male than for female workers. In other words: provided that they possess only secondary education degrees, both male and female workers forego income if they opt for an EHW occupation, while the loss is larger for men than for women. In absolute terms, of course, our findings confirm the well-known fact that men earn more than women, both outside and inside EHW occupations (though the gap is smaller in EHW, which can have to do with the more-equal wages setting in public service compared to the private sector).

Our analysis found marked income differences between EHW occupations, which can be due to compositional differences regarding gender and education, among other things. Medical doctors are clearly at the top of the income hierarchy, with a net monthly income from work that we calculate as 46%

higher than average workers' income across the 24 countries in the period between 2016 and 2020 (Graph 7). This figure is not based on exact amounts, as the raw data only provides us with income deciles. The majority of medical doctors are situated in the top earnings decile (which is open ended), and the true relative income is probably even higher than the one we calculated. The advantage of the data we use here is that it contains information on a large number of countries and allows us to observe individual occupations. With regard to medical doctors, for example, we can thus assert that the relative incomes are particularly high in Croatia and Portugal, while in France and Romania medical doctors have a comparatively weak income advantage over other workers (Table 8). The EHW occupational group that ranks just below medical doctors in terms of income are "university and higher education teachers" followed by secondary, then vocational, and then primary education teachers.

"Child care workers and teachers' aides" are situated at the lower end of the income distribution, they take home only 61% of what full-time workers (across all occupations, across Europe) earn on average (Graph 7). The only other occupational group featuring similarly low incomes are "personal care workers in health services" with 74% of average full-timers' incomes. While there is no single country in our sample where these two groups reach average incomes, the degree at which they are penalised differs widely. In Austria, Czech Republic, France, Greece, Ireland, and Romania, "personal care workers in health services" take home incomes at levels between 80% and 90% of what full-time workers usually earn, and "child care workers and teachers' aides" earn in that range in Czech Republic, Greece, Romania, and Slovakia. By contrast, earnings of the latter group are only between 40% and 50% in many countries, like Switzerland, Germany, Estonia, Finland, Croatia, Luxembourg, and Latvia (Table 7). These two groups are clearly among the less qualified care workers, if we look at schooling degrees, and only around 8% have supervisory responsibilities (compared to 22.1% of all full-time workers and 19.3% of all full-time EHW workers, cp. Table 6). However, working with dependent clients always implies a certain degree of responsibility, and "child care workers and teachers' aides", who are particularly poorly paid, carry part of the responsibility for the learning and development of children.[69]

In our analysis of income inequality between workers, we have sought to consider structural differences of countries' labour markets. The idea is that a worker's income position in the labour market depends not only on how well her occupation is paid, but also on how the workforce is distributed across occupations in their country. Let us take for example two persons working as a nurse—generally a medium-income occupation—in two different countries. In one country, there are many low-paid jobs in agriculture and tourism, but few jobs in the high-salaried car or financial industry. In the other country, the contrary is the case. Of the two nurses, the one living and working in the former country will occupy a better relative income position than the one in the latter country (even if their purchasing power is identical). This highlights the importance of national employment systems' structures, next to different rewards to occupations, for comparing the social positions of workers between countries.

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[69] Note, however, that even the low-qualified and low-paid groups in our sample of EHW occupations count into what some authors term "nurturant care work" (Dwyer 2013, 413). Next to them, or rather below in the occupational hierarchy, other groups of workers also perform reproductive work, but without an emphasis on "skills in relating to people and knowledge about human bodies and capacities" (ibid., 395). The latter mostly exercise physical labor (e.g. kitchen and laundry workers, cleaners, waiters, etc., ibid, 413) and usually take home very low incomes.

The empirical difference our alternative approach of determining relative incomes made was mostly the one just explained in the example: the countries where EHW workers occupy particularly favourable income positions are often countries that lack a strong private sector, which sustains branches of high added value. A qualified position in EHW, e.g. as a teacher, grants a relatively elevated income position in these countries. However, labour-market structures do not explain everything. Also, in the comparison between occupations (instead of workers), countries like Portugal, Cyprus, Croatia, Hungary, and Spain are still among those where EHW work is most rewarded compared to other European countries. The hierarchy of earnings between EHW occupations is also reproduced by a structure-sensitive comparison.

The perspective that controls for structural effects adds some insight into the dynamic perspective: it seems that the relative income of EHW occupations compared to non-EHW-occupations has remained rather stable in Europe in the decade of the 2010s. Between the two periods, 2012–2015 and 2016–2020, the change of EHW *occupations'* relative incomes (compared to all other occupations' incomes) has been only marginal (0.3 p.p., see Table 11). Still, during that period, we can speak of a decline of EHW *workers'* income positions. Compared to the net monthly income of the average full-time worker, EHW incomes shrank by 1.2 p.p. Our explanation is that while EHW occupations' monetary rewards grew at average pace, there has been an upgrading of labour-market structures in the meantime. The share of low-paid jobs decreased, and the share of high-paid jobs increased in the observed economies. This phenomenon can be explained by the theory of SBTC (see 2.1.1), and also by the growth of trade with low-income countries. Considering that the years between 2012 and 2015 are still marked by the Eurocrisis, a subsequent economic recovery, particularly in the private sector, can also explain the trend. But no matter the explanation, if we analyse EHW work's attractiveness in terms of income, what ultimately counts is the relative income position in society that can be reached by choosing an EHW occupation. In this respect, the attractiveness of EHW as a domain of professional activity seems to have declined a bit in the course of the 2010s.

Another empirical observation made from a dynamic perspective is a slight form of income convergence, both between EHW occupations and between EHW incomes in different countries: it is mostly the well-paid EHW occupations like doctors and university teachers that have lost a bit of their income premium in the course of the 2010s, just like it is the countries with the highest initial rewards to EHW labour where these incomes declined most during the observation period.

A final step of empirical analysis has been to group countries according to the incomes taken home by the observed EHW occupational groups. We have found a cluster of countries where EHW occupations are generally less remunerated than in most European countries (the Baltics and Slovakia). Then, there are countries where teachers, qualified nursery teachers and medical doctors are relatively well paid, but not the other occupations related to health care and not the lower-qualified staff in child care (Germany, Finland, and Switzerland). Some observed countries, like Cyprus, Croatia, and Portugal, grant incomes above the occupation-specific European average to most of their EHW workers except for "child care workers and teachers' aides" and "personal care workers in health services". The latter earn particularly low incomes in these countries. The biggest group of countries, however, features the opposite of that profile: workers in most EHW occupations, also qualified ones, take home less than their peers in other European countries, while the two lowest-earning groups are slightly better off than in other countries. There is, thus, a more-equal wage structure, which applies for example in Czech Republic, Denmark,

Ireland, the Netherlands, and Romania. It is remarkable to see that all the clusters include both high- and low-income countries. Also, clusters include countries from different regions in Europe and from different "care regimes" and "worlds of welfare". The fact that political traditions do not seem to structure EHW occupations' income positions is surprising at first. Unlike technology, which spreads across borders, political cross-country differences persist over time. It may be the multitude of influences of the EHW wage structure—public budget, voters' preferences, negotiation mechanisms, demography, etc.— which prevents regime typologies or the mere polarity between rich and poor countries to govern the grouping of countries here.

5.2   Limitations of this study

There are some limitations of our study that should be highlighted in order to contextualise the results. One source of limitation is the data source itself, which only provides us with income deciles derived from monthly income. The consequences have been explained in detail in chapter 3. One implication of the lack of hourly income information is that we had to limit our sample to a group with similar working hours, so we opted for a definition of full-time workers that ranges from 35 to 44 working hours per week. Part-time workers, who play an important role in EHW, are not part of our study.

An implication of the lack of accuracy of income deciles as opposed to monetary amounts (in currency values) is that our results cannot be precise. In particular, real monetary distances between deciles can be unequal, and the highest decile can include very heterogeneous and also extremely high incomes, which remain underreported.[70] A similar problem applies to the lowest income decile. Further research could implement the idea put forward by Stehrer and Ward (2012) to replicate income deciles with EU-SILC data, calculate the real monetary income per decile, and match this information to the EU-LFS.

Another limitation concerns the timeliness of the data. The observation period reaches until the year 2020, and we mostly pooled observations since 2016. As of 2020, the Coronavirus pandemic has strongly strained the care sector and deteriorated working conditions, but it has also led to upward revisions of wages in some countries. An update of the present work is not straightforward, however, as the EU-LFS methodology is significantly changed as of the field year 2021. This change can restrict the comparability of the newest data with earlier years. In that sense, the data set used in the present analysis is the last EU-LFS data for some time that can be safely pooled and compared across several years (at least with regard to survey items that have been changed).

The analysis in this paper is descriptive: income differences between occupational groups are reported as they are. The explanation of these differences can involve a wage effect of the occupation itself, e.g. due to occupational closure. Yet knowing that workers' qualities differ in more dimensions than just their occupation, and that these differences can have their own effects on incomes, we would have to control for compositional differences in order to obtain the net income effect of occupations. This can be done by

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[70] Explanation: employees who earn top incomes will raise the mean income of persons in the 10th income decile. It is very probable that the distance, measured in currency units, between the mean income of decile 8 and decile 9 is smaller than between decile 9 and decile 10. Yet we cannot observe these mean incomes of deciles. All we can do is analyse the income deciles attributed to observed persons, respectively, the mean income deciles of groups of persons.

way of multivariate analysis, but we leave this step for a subsequent publication. Rather, the present analysis belongs to the realm of labour-market reporting, rather than causal analysis.

5.3   Conclusion and outlook

As different as the various crises of recent years have been, they have two things in common: they both underscore the importance of EHW work and deplete public funds. The Coronavirus pandemic has highlighted how vital a functioning health care system is to society, and it has cost billions to government budgets for test kits, vaccines, sickness benefits as well as subsidies to struggling businesses. The Russian war in Ukraine brings a new surge of refugees who challenge host countries' education systems (which absorb additional schoolchildren) and health systems (which treat additional patients, partly in need of psychological care or medical treatment). The indispensability and cost of national security precautions has also come to the fore. And just like the pandemic, this most recent crisis depresses the economy and thus weakens government revenue. The consequences of depleted public funds are already palpable in various domains of public service. Public awareness and appreciation of EHW workers' contributions to society may have been boosted by the recent cascade of crises and triggered one-off payments or pay rate increases for some groups. In the longer run, however, EHW workers' quest for higher monetary compensation—in a context of high inflation—may be confronted with a new wave of government austerity policies.

A more positive aspect for workers in the labour market for years to come will be a near absence of unemployment in some countries, or at least a much lower unemployment rate than before all over Europe. The so-called baby boomer generation is now successively reaching pension age, while labour-market entrants are becoming fewer and fewer. This change means that the discussions are now no longer about whether and how the service sector will absorb enough workers to prevent mass unemployment (Fourastié 1989), but whether there will be enough qualified workers to do the work that has to be done.

This implies a wholly different outlook that workers have on their own working lives, and it is bound to change their expectations towards work. Without a doubt, the quest for self-fulfilment will become an even more important factor in occupational choice. Some have also reported an increased awareness of the young for "community and public concerns" (Hurrelmann and Albrecht 2014). These trends could play out in favour of EHW work, which is commonly perceived as socially useful and less alienated than other kinds of work. But how will expectations evolve regarding income from work, and how crucial will pay be next to preferences regarding work content, management culture, and social recognition?

In accordance with earlier work, our analysis has highlighted a segment of EHW work that is truly affected by low wages at present, the low-qualified personal care workers. We have not analysed the household context, but it can be assumed that part of these mostly female workers lives in dual earner households where the (male) partner has a superior income from work; in other words, the partner's income is crucial for sustaining the shared standard of living. In a context of continuing individualisation and many women seeking full economic independence, this model will probably be accepted less and less in the future. This is one reason why low-qualified care workers may start to pursue their own interests more assertively. Trade unions may become increasingly successful in organising and representing these workers, which

could turn into a problem for employers who seek labour for low pay and for clients and all stakeholders of care services.

In a future labour market, characterised not only by shortages of skilled labour, but also shortages of labour in general, power will be in the hands of those who can offer or withhold necessary services. The greater the shortage of workers, the more untenable the work situation for those who do work, the better also is their bargaining position. This logic exacerbates a dilemma that has been dubbed the "prisoner of love" situation: a favourable labour market situation makes it easier to escape to other kinds of jobs. But both (former) colleagues as well as needy clients are all the more affected if care workers quit.

6. Literature

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7. Abbreviations

ALMP	active labour-market policy
EHW	education, health, welfare
EIGE	European Institute for Gender Equality
EU	European Union
EU-LFS	EU Labour Force Survey
EU-SES	EU Structure of Earnings Survey
EU-SILC	EU Statistics on Income and Living Conditions
ISCO	International Standard Classification of Occupations
NACE	Statistical Classification of Economic Activities in the European Community (originally: Nomenclature statistique des activités économiques dans la Communauté européenne)
PLMP	passive labour-market policy
RBTC	routine-biased technological change
SBTC	skill-biased technological change

8. Appendix

Appendix table 1: Share of persons with non-missing income information among persons fulfilling all other sampling criteria, by country and year (%)

Country	2012	2013	2014	2015	2016	2017	2018	2019	2020
AT Austria	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	
BE Belgium	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
CH Switzerland	0.94	0.93	0.94	0.95	0.95	0.96	0.96	0.96	0.96
CY Cyprus	0.95	0.95	0.96	0.95	0.95	0.95	0.95	0.95	0.95
CZ Czech Republic	1.00	1.00	1.00	1.00	1.00	1.00			
DE Germany	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	
DK Denmark	0.78	0.74	0.79	0.80	0.78	0.83	0.83	0.76	0.83
EE Estonia	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
ES Spain	0.95	0.95	0.95	0.96	0.95	0.95	0.94	0.93	
FI Finland	0.47	0.47	0.48	0.48	0.49	0.49		0.50	0.50
FR France	0.33	0.16	0.16	0.17	0.17	0.16	0.16	0.16	0.50
GR Greece	0.81	0.76	0.80	0.88	0.88	0.85	0.82	0.89	0.90
HR Croatia	0.77	0.76	0.74	0.76	0.75	0.74	0.77	0.78	0.76
HU Hungary	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
IE Ireland	0.36	0.32	0.29	0.27	0.29	0.33	0.40	0.43	0.42
IT Italy	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
LT Lithuania	0.80	0.82	0.71	0.90	0.93	0.92	0.94	0.90	0.83
LU Luxembourg	0.91	0.91	0.91	0.71	0.50	0.59	0.31	0.32	0.54
LV Latvia	0.97	0.97	0.98	0.98	0.98	0.98	0.98	0.99	0.99
NL Netherlands	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
PT Portugal	0.89	0.89	0.90	0.90	0.90	0.90	0.89	0.88	0.90
RO Romania	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
SK Slovak Republic	0.64	0.61	0.59	0.62	0.72	0.73	0.74	0.74	
UK United Kingdom		0.75	0.75	0.75	0.75	0.76	0.75	0.75	

Source: EU-LFS, own calculations. Note: 1.00 corresponds to one hundred percent, thus no missings in the item INCDECIL. The table only presents country-years where at least some income data has been delivered.

Appendix table 2: Number of workers in the complete sample of observation, by country and year

Country	2012	2013	2014	2015	2016	2017	2018	2019	2020
AT	19,997	19,974	19,287	18,894	19,616	19,897	19,950	20,175	(20,175)
BE	12,923	12,725	13,439	12,668	13,046	8,365	8,017	8,497	6,745
CH	18,880	17,935	17,687	17,865	17,444	17,777	17,418	16,980	17,266
CY	4,542	4,242	3,913	3,940	4,031	4,216	4,462	4,396	4,303
CZ	12,034	11,703	11,635	11,827	11,928	11,858	(11,858)	(11,858)	(11,858)
DE	108,317	108,711	110,626	112,101	124,534	128,060	129,360	130,099	(130,099)
DK	18,055	17,485	18,555	18,320	17,283	17,644	18,479	17,032	17,846
EE	4,668	4,912	5,093	4,879	5,009	6,067	6,376	6,423	6,517
ES	19,161	18,016	18,118	19,374	19,142	19,546	20,128	20,679	(20,679)

FI	6,533	6,206	6,385	6,053	6,209	6,071	(6,071)	5,899	5,554
FR	32,351	14,513	15,676	15,649	16,150	15,644	15,489	15,362	10,852
GR	9,576	8,518	8,860	9,855	10,029	10,108	9,446	10,354	9,206
HR	3,952	3,742	3,910	4,042	4,003	3,981	4,500	4,327	4,013
HU	29,284	28,353	29,154	28,810	29,877	29,866	28,713	27,563	25,765
IE	8,263	6,790	6,376	5,557	5,729	7,092	6,554	7,282	5,729
IT	64,836	63,489	61,700	61,148	61,444	62,168	63,003	62,967	58,992
LT	9,202	9,408	7,864	10,162	10,588	11,422	11,843	11,094	9,325
LU	5,158	3,444	2,982	3,390	3,113	2,622	2,112	2,588	2,561
LV	6,332	7,281	7,751	8,087	7,932	4,704	4,522	2,873	2,860
NL	16,095	16,114	14,660	13,887	13,928	13,976	15,813	14,368	14,031
PT	15,056	14,972	16,376	17,131	17,324	17,414	17,276	16,559	13,482
RO	30,871	30,913	31,463	36,384	36,412	38,404	39,120	38,248	36,386
SK	7,065	6,394	6,034	6,220	8,703	8,771	9,096	8,968	(8,968)
UK	(9,577)	9,577	9,932	9,435	9,421	9,745	10,171	10,489	(10,489)
Total	472,728	445,417	447,476	455,678	472,895	475,418	479,777	475,080	453,701

Source: EU-LFS, own calculations. Note: Values in (brackets) mark country-years with a lack of original data. Information from the adjacent country-year was substituted to fill the gap.

Appendix table 3: Occupational groups included in approach 2 for creating an income reference value

Included in the reference group	Dropped
Administration professionals Administrative and specialised secretaries Agricultural, forestry and fishery labourers; Animal producers Architects, planners, surveyors and designers Armed forces occupations, other ranks Artistic, cultural and culinary associate professionals Assemblers Authors, journalists and linguists Blacksmiths, toolmakers and related trades workers Building and housekeeping supervisors Building finishers and related trades workers Building frame and related trades workers Business services agents Business services and administration managers Car, van and motorcycle drivers Cashiers and ticket clerks Chemical and photographic products plant and machine operators child care workers and teachers' aides Client information workers Commissioned armed forces officers Cooks Creative and performing artists Database and network professionals Domestic, hotel and office cleaners and helpers Electrical equipment installers and repairers Electronics and telecommunications installers and repairers Electrotechnology engineers Engineering professionals (excluding electrotechnology) Finance professionals Financial and mathematical associate professionals	Administrative and commercial managers Agricultural, forestry and fishery labourers ARMED FORCES OCCUPATIONS Building and related trades workers, excluding electricians Business and administration associate professionals Business and administration professionals Chief executives, senior officials and legislators Cleaners and helpers CLERICAL SUPPORT WORKERS Commissioned armed forces officers CRAFT AND RELATED TRADES WORKERS Customer services clerks Drivers and mobile plant operators Electrical and electronic trades workers ELEMENTARY OCCUPATIONS Food preparation assistants General and keyboard clerks Health associate professionals Health professionals Hospitality, retail and other services managers Information and communications technicians Information and communications technology professionals Labourers in mining, construction, manufacturing and transport

Fishery workers, hunters and trappers
Food and related products machine operators
Food preparation assistants
Food processing and related trades workers
Forestry and related workers
Garment and related trades workers
General office clerks
Hairdressers, beauticians and related workers
Handicraft workers
Heavy truck and bus drivers
Hotel and restaurant managers
Information and communications technology operations and user support technicians
Information and communications technology service managers
Keyboard operators
Legal professionals
Legal, social and religious associate professionals
Legislators and senior officials
Librarians, archivists and curators
Life science professionals
Life science technicians and related associate professionals
Locomotive engine drivers and related workers
Machinery mechanics and repairers
Managing directors and chief executives
Manufacturing labourers
Manufacturing, mining, construction, and distribution managers
Market gardeners and crop growers
Material-recording and transport clerks
Mathematicians, actuaries and statisticians
medical and pharmaceutical technicians
medical doctors
Metal processing and finishing plant operators
Mining and construction labourers
Mining and mineral processing plant operators
Mining, manufacturing and construction supervisors
Mixed crop and animal producers
Mobile plant operators
Non-commissioned armed forces officers
Numerical clerks
Nursing and midwifery associate professionals
Nursing and midwifery professionals
Other clerical support workers
Other craft and related workers
Other elementary workers
Other health associate professionals
Other health professionals
Other personal services workers
Other sales workers
Other services managers
Other stationary plant and machine operators
other teaching professionals
Painters, building structure cleaners and related trades workers
personal care workers in health services
Physical and earth science professionals
Physical and engineering science technicians
primary school and early childhood teachers
Printing trades workers
Process control technicians
Professional services managers
Protective services workers

Legal, social and cultural professionals
Legal, social, cultural and related associate professionals
MANAGERS
Market-oriented skilled forestry, fishery and hunting workers
Metal, machinery and related trades workers
Numerical and material recording clerks
Other clerical support workers
Paramedical practitioners
Personal care workers
Personal service workers
PLANT AND MACHINE OPERATORS AND ASSEMBLERS
Production and specialised services managers
Production managers in agriculture, forestry and fisheries
PROFESSIONALS
Protective services workers
Sales workers
Science and engineering associate professionals
Science and engineering professionals
SERVICE AND SALES WORKERS
Stationary plant and machine operators
Street and related service workers
Street vendors (excluding food)
Subsistence crop farmers
Subsistence fishers, hunters, trappers and gatherers
Subsistence livestock farmers
Subsistence mixed crop and livestock farmers
Teaching professionals
TECHNICIANS AND ASSOCIATE PROFESSIONALS
Traditional and complementary medicine associate professionals
Traditional and complementary medicine professionals

Refuse workers	
Regulatory government associate professionals	
Retail and wholesale trade managers	
Rubber, plastic and paper products machine operators	
Sales and purchasing agents and brokers	
Sales, marketing and development managers	
Sales, marketing and public relations professionals	
secondary education teachers	
Secretaries (general)	
Sheet and structural metal workers, moulders and welders, and related workers	
Ship and aircraft controllers and technicians	
Ships' deck crews and related workers	
Shop salespersons	
Social and religious professionals	
Software and applications developers and analysts	
sports and fitness workers	
Street and market salespersons	
Telecommunications and broadcasting technicians	
Tellers, money collectors and related clerks	
Textile, fur and leather products machine operators	
Transport and storage labourers	
Travel attendants, conductors and guides	
university and higher education teachers	
Vehicle, window, laundry and other hand cleaning workers	
Veterinarians	
Veterinary technicians and assistants	
vocational education teachers	
Waiters and bartenders	
Wood processing and papermaking plant operators	
Wood treaters, cabinet-makers and related trades workers	

Source: EU-LFS, own selection.

Appendix table 4: Shares of full-time employees who work in EHW occupations and corresponding branches, by country, 2016–2020

Occupational group	Share (%)
child care workers and teachers' aides	0.3
Primary school and early childhood teachers	5.9
secondary education teachers	19.7
vocational education teachers	16.7
university and higher education teachers	38.6
sports and fitness workers	5.1
other teaching professionals	9.6
medical doctors	63.3
Nursing and midwifery (associate) professionals	5.1
personal care workers in health services	0.4
medical and pharmaceutical technicians	3.5
other health (associate) professionals	4.7
Social and religious (associate) professionals	3.6
All other workers	9.9

Source: EU-LFS, own calculations. Note: Weighted values. Full-time workers only.

Appendix table 5: Usual tasks of ISCO groups associated with EHW, as described in the EU commission's ESCO dictionary of occupations

Occupational group	Usual tasks	Link
Child care workers and teachers' aides	"Child care workers and teachers' aides provide care and supervision for children in schools, residential homes and child care facilities. Tasks performed usually include: assisting children individually to learn social skills; demonstrating, supervising and participating in activities that enhance the physical, social, emotional and intellectual development of children in schools and preschools; […]"	http://data.eur opa.eu/esco/is co/C531
Primary school and early childhood teachers	"Primary school and early childhood teachers teach a range of subjects at the primary level of education and organize educational activities for children below primary school age. Tasks performed usually include: preparing programmes of learning and giving instruction in a range of subjects at the primary education level, planning and organizing activities designed to facilitate children's development of language, physical and social skills; preparing reports. Supervision of other workers may be included."	http://data.eur opa.eu/esco/is co/C234
Secondary education teachers	"Secondary education teachers teach one or more subjects at secondary education level, excluding subjects intended to prepare students for employment in specific occupational areas. Tasks performed usually include: preparing and giving lessons, discussions, and demonstrations in one or more subjects; […] adapting teaching methods and instructional materials to meet students' varying needs and interests; observing and evaluating students' performance and behaviour; […]"	http://data.eur opa.eu/esco/is co/C233
Vocational education teachers	"Vocational education teachers teach or instruct vocational or occupational subjects in adult and further education institutions and to senior students in secondary schools and colleges. They prepare students for employment in specific occupations or occupational areas for which university or higher education is not normally required. Tasks performed usually include: developing curricula and planning course content and methods of instruction; determining training needs of students or workers and liaising with individuals, industry and other education sectors to ensure provision of relevant education and training programmes; presenting lectures and conducting discussions to increase students' knowledge and competence; instructing and monitoring students in the use of tools, equipment and materials and the prevention of injury and damage; observing and evaluating students' work to determine progress, provide feedback and make suggestions for improvement; […]."	http://data.eur opa.eu/esco/is co/C232
University and higher education teachers	"University and higher education teachers prepare and deliver lectures and conduct tutorials in one or more subjects within a prescribed course of study at a university or other higher educational institution. They conduct research, and prepare scholarly papers and books. Tasks performed usually include: designing and modifying curricula and preparing courses of study in accordance with requirements; preparing and delivering lectures and conducting tutorials, seminars and laboratory experiments; stimulating discussion and independent thought among students; supervising, where appropriate, experimental and practical work undertaken by students; […]"	http://data.eur opa.eu/esco/is co/C231
Sports and fitness workers	"Sports and fitness workers prepare for and compete in sporting events for financial gain; train amateur and professional sportsmen and women to enhance performance; promote participation and standards in sport; organize and officiate sporting events; and provide instruction, training and supervision for various forms of exercise and other recreational activities. Tasks performed usually include: […] developing and designing fitness programmes; delivering group exercise classes and personal tuition in a variety of fitness activities; promoting sports and sports skills development; and overseeing the participation of young people in sport."	http://data.eur opa.eu/esco/is co/C243
Other teaching professionals	"other teaching professionals conduct research and advise on teaching methods; teach people with learning difficulties or special needs; teach non-native languages for migration and related purposes; give private tuition; teach arts, information technology and other subjects outside the mainstream primary, secondary and higher education systems; […] teaching physically handicapped children, young persons or adults or those with learning difficulties or other with special needs, teaching non-native languages for	http://data.eur opa.eu/esco/is co/C235

	migration purposes; teaching students in practice, theory and performance of music, drama, dance, visual and other arts; developing, scheduling and conducting training programmes and courses for information technology users."	
Medical doctors	"Medical doctors (physicians) study, diagnose, treat and prevent illness, disease, injury and other physical and mental impairments in humans through the application of the principles and procedures of modern medicine. They plan, supervise and evaluate the implementation of care and treatment plans by other health care providers, and conduct medical education and research activities. Tasks performed usually include: conducting physical examinations of patients and interviewing them and their families to determine their health status; ordering diagnostic tests and analysing findings; prescribing and administering curative treatments and preventive measures; performing surgery and other clinical procedures; monitoring patients' progress and response to treatment; advising on health, nutrition and lifestyle behaviours which aid prevention or treatment of disease and disorders; […]."	http://data.eur opa.eu/esco/is co/C221
Nursing and midwifery (associate) professionals	"Nursing and midwifery professionals provide treatment and care services for people who are physically or mentally ill, disabled or infirm, and others in need of care due to potential risks to health including before, during and after childbirth. They assume responsibility for the planning, management and evaluation of the care of patients, including the supervision of other health care workers, working autonomously or in teams with medical doctors and others in the practical application of preventive and curative measures." "Nursing and midwifery associate professionals provide basic nursing and personal care for people who are physically or mentally ill, disabled or infirm, and for others in need of care due to potential risks to health including before, during and after childbirth. They generally work under the supervision of, and in support of, implementation of health care, treatment and referrals plans established by medical, nursing, midwifery and other health professionals."	http://data.eur opa.eu/esco/is co/C222 http://data.eur opa.eu/esco/is co/C322
Personal care workers in health services	"Personal care workers in health services provide personal care and assistance with mobility and activities of daily living to patients and elderly, convalescent and disabled people in health care and residential settings. Tasks performed usually include: assisting patients with mobility, personal care and communication needs; sterilizing surgical and other instruments and equipment; observing and reporting concerns to the appropriate medical or social service workers; preparing patients for examination and treatment and participating in planning the care of individuals."	http://data.eur opa.eu/esco/is co/C532
Medical and pharmaceutica l technicians	"Medical and pharmaceutical technicians perform technical tasks to assist in diagnosis and treatment of illness, disease, injuries and impairments. Tasks performed usually include: testing and operating radiographic, ultrasound and other medical imaging equipment; administering radiopharmaceuticals or radiation to patients to detect or treat diseases; performing clinical tests on specimens of bodily fluids and tissues; preparing medications and other pharmaceutical compounds under the guidance of pharmacists; designing, fitting, servicing and repairing medical and dental devices and appliances."	http://data.eur opa.eu/esco/is co/C321
Other health (associate) professionals	"Other health professionals provide health services related to dentistry, pharmacy, environmental health and hygiene, occupational health and safety, physiotherapy, nutrition, hearing, speech, vision and rehabilitation therapies. This minor group includes all human health professionals except doctors, traditional and complementary medicine practitioners, nurses, midwives and paramedical professionals." "Other health associate professionals perform technical tasks and provide support services in dentistry, medical records administration, community health, the correction of reduced visual acuity, physiotherapy, environmental health, emergency medical treatment and other activities to support and promote human health."	http://data.eur opa.eu/esco/is co/C226 http://data.eur opa.eu/esco/is co/C352
Social and religious (associate) professionals	"Social and religious professionals conduct research; improve or develop concepts, theories and operational methods; apply knowledge relating to philosophy, politics, economics, sociology, anthropology, history, psychology and other social sciences; or provide social services to meet the needs of individuals and families in a community. Tasks performed usually include: […]	http://data.eur opa.eu/esco/is co/C263 http://data.eur

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studying mental processes and behaviour of individuals and groups; providing social services; […]."	opa.eu/esco/is co/C341
"Legal, social and religious associate professionals provide technical and practical services and support functions in legal processes and investigations, social and community assistance programmes and religious activities. Tasks performed usually include: […] administering and implementing social assistance programmes and community services; assisting clients to deal with personal and social problems; providing practical assistance, guidance and moral support to individuals and communities."	

Source: ESCO (European Commission), update version of 02/12/2021. Last accessed 2022-01-14 via the links provided in the table. Note: Among the tasks ascribed to each occupation, we name some that especially reflect the interactive character of the work.

Appendix table 6: Trend of relative incomes of EHW occupations compared to all occupations, by occupational group and country. 2016–2020 vs. 2012–2015 (approach 2)

Occupational group	Very strong decline (<= -10 p.p.)	Strong decline (<= -5 p.p.)	Decline (<= -2.5 p.p.)	Stability (> -2.5 p.p. to < 2.5 p.p.)	Improve ment (>=2.5 p.p.)	Strong improve ment (>= 5 p.p.)	Very strong improve ment (>= 10 p.p.)
child care workers and teachers' aides	–	CH CZ	NL IT PT	FR CY UK DK SK LV AT FI BE DE	–	EE IE	RO LT GR ES HU
primary school and early childhood teachers	–	CY CZ UK	DK HR	IT ES LT PT DE IE FR FI LV BE	AT GR NL	RO LU CH SK	HU EE
secondary education teachers	LT	IT UK	BE CY FI IE LV	DE LU CZ FR AT HR	GR RO CH NL DK PT ES SK	EE HU	–
vocational education teachers	LT	DK UK	LV SK	FI ES EE AT IT DE NL FR BE	LU CH CZ RO	–	HU HR GR
university and higher education teachers	RO SK LV GR LT	CY CZ IE	DK EE UK	HR DE NL ES IT AT FR CH BE HU	PT FI	–	–
other teaching professionals	HR	IE LT UK	PT NL DK ES IT DE FI	EE LU SK CH CZ AT	LV BE	HU CY GR	RO
medical doctors	SK CY LV CZ	DK LT RO	ES BE FR	PT EE IE NL GR DE IT UK	AT HR FI	HU CH	–
nursing and midwifery (associate) professionals	CZ	–	CY FR UK	LT HR NL PT DE DK IE ES FI IT CH BE	RO SK AT HU	LU GR	EE LV
personal care workers in health services	CZ HR	–	NL FI BE ES CY PT	LT LV UK DK CH FR IT	AT LU SK DE IE	EE GR HU	RO
medical and pharmaceutical technicians	HR CY CZ	SK RO FR UK	AT IE	GR DE CH BE NL ES DK IT	LT PT HU	FI	LV
other health (associate) professionals	CZ	AT HR	FR IT DK ES	UK CH SK PT GR EE RO FI	LV IE LT DE	BE NL HU	CY
social and religious (associate) professionals		CY CZ	IT LV AT IE DK FR CH	SK BE DE PT FI UK ES NL	EE HU LT	RO LU	GR HR

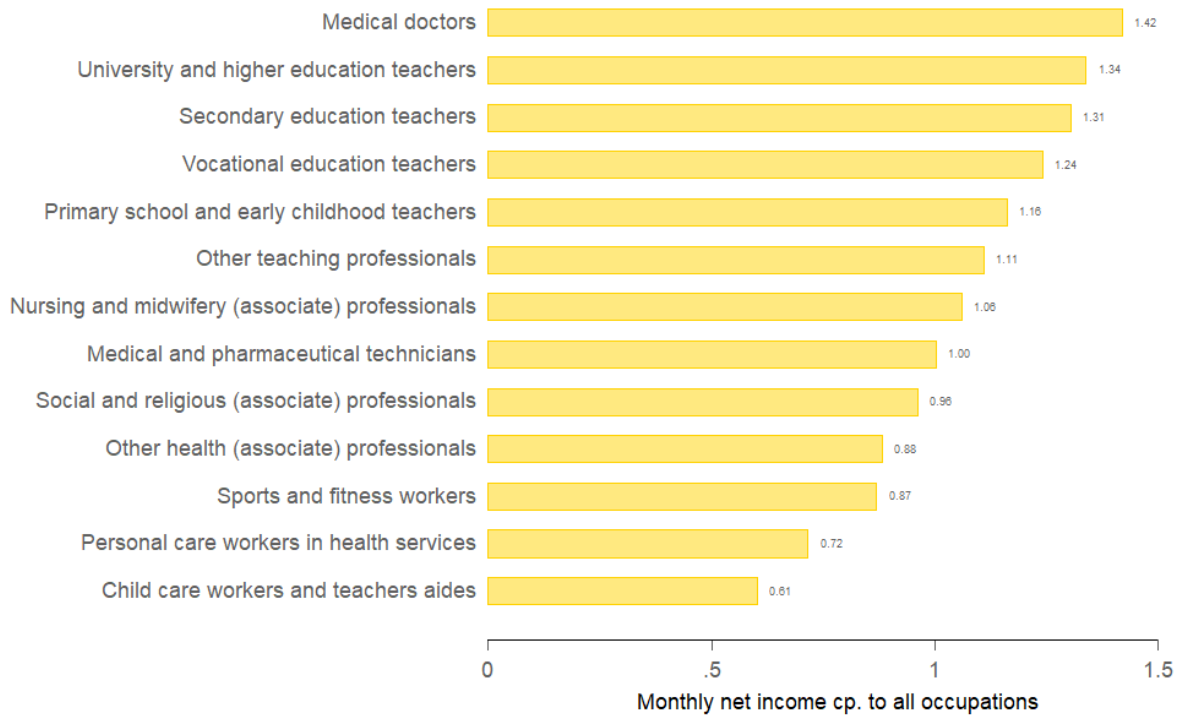*Source: EU-LFS, own calculations. Note: Weighted values. Full-time workers only.*

Appendix graph 1: Shares of full-time employees who work in EHW occupations and corresponding branches, by country, 2016–2020

Source EU-LFS, own calculations. Weighted values. Full-time employees only.
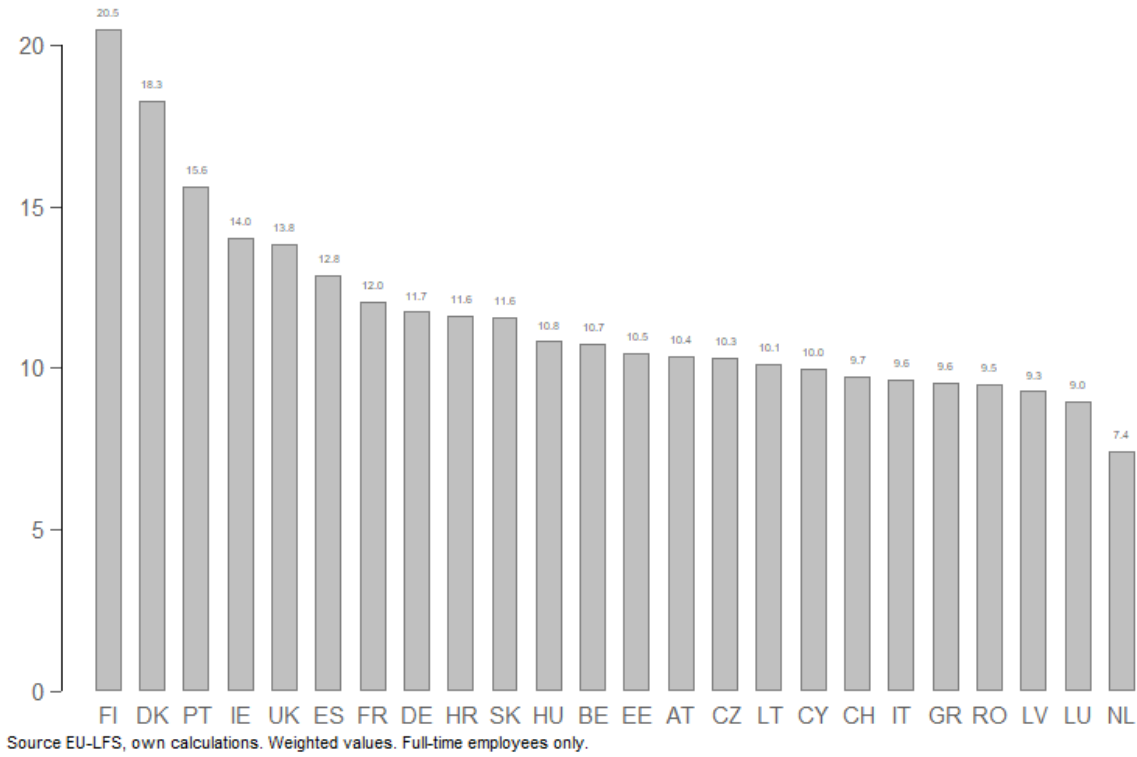
Appendix graph 2: Occupational composition of full-time employees in EHW activities, by country (%)

Source: EU-LFS, own calculations. Weighted values. Averages across country-years with available data. Full-time employees only.
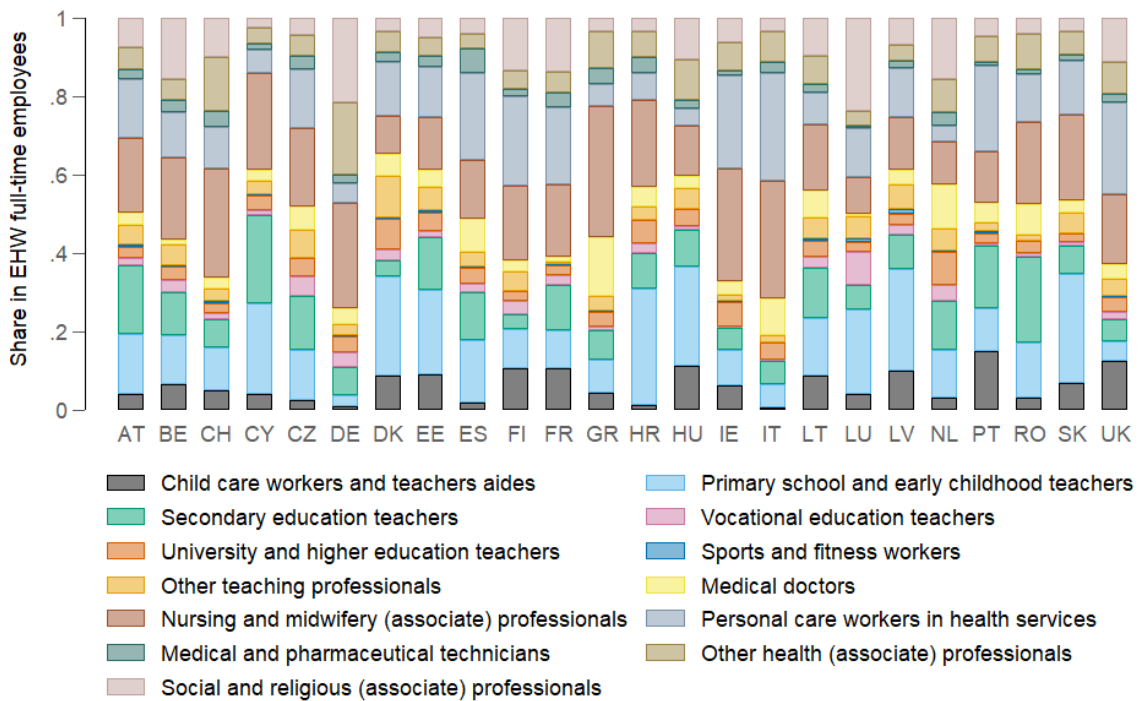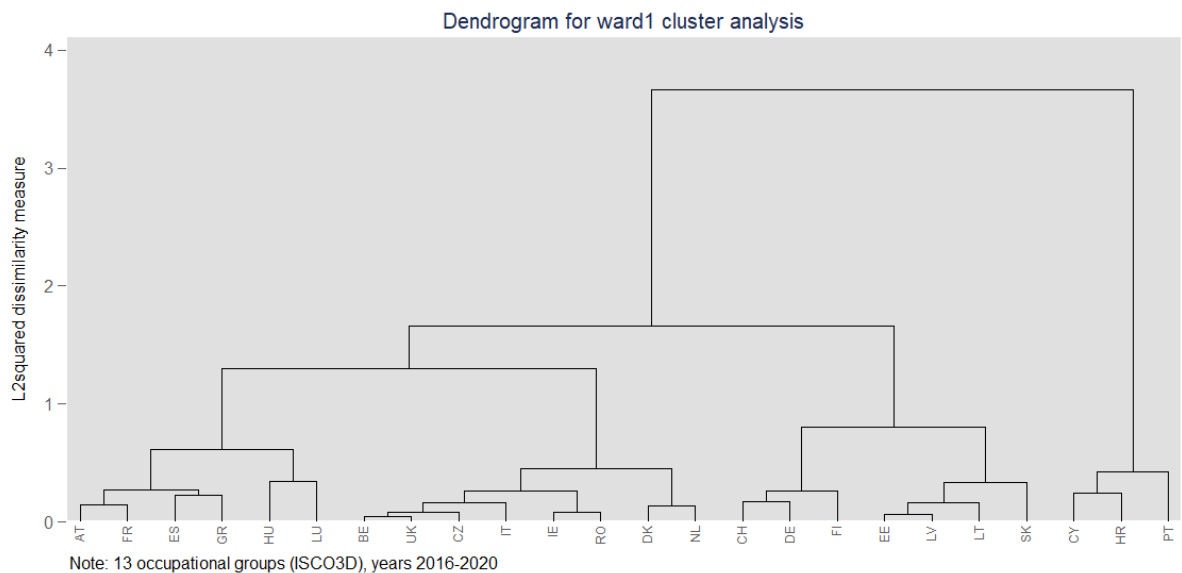
Appendix graph 3: Relative incomes of EHW occupations, by occupational group.
Average across 24 European countries, 2016–2020

Source: EU-LFS, own calculations. Weighted values. Averages across 24 countries. Full-time employees only.

Appendix graph 4: Dendrogram of cluster analysis with Ward algorithm (approach 1)

Note: 13 occupational groups (ISCO3D), years 2016-2020

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Sociological Research Institute Goettingen (SOFI)
Friedlaender Weg 31
37085 Goettingen
Germany
sofi@sofi.uni-goettingen.de