



Financial burden of medicines in five Northern European countries: A decommodification perspective

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ABSTRACT

Affordable access to healthcare including medicines is a key social policy goal in Europe. However, it has rarely been addressed in comparative social policy research. Although the concept of decommodification has already been used in the context of healthcare and sickness benefits, we argue that the scope of such studies should be expanded to medicines to understand how welfare states protect their citizens from market forces in case of illness. We examine and compare the relationship between income, other characteristics, and subjective financial burden of medicines (FBM) across five countries with universal health systems pursuing egalitarian aims (Denmark, Finland, the Netherlands, Norway and Sweden). Analyses using 2017 EU-SILC microdata and linear probability models showed large differences in the level of FBM across countries, with the highest income quintile in Finland reporting FBM more frequently than the lowest income quintile in Denmark. Finland differed from the rest by increasing probability of FBM with age. In other countries, middle-aged adults tended to be the most affected, and older adults were well-protected. The association between income and FBM was strongest in the Netherlands; however, the higher probability of FBM was skewed towards the lower quintiles in all countries. FBM and financial burden of medical care were strongly associated although FBM tended to be more common. Unmet needs for medical examination were rare and lacked sensitivity in capturing manifestations of market risk. Decommodification literature has focused healthcare services as proxy of access; nevertheless, our study shows that further functions, and broader outcomes should be examined to capture market risk. Our evidence further highlights that important differences can be found even in countries with relatively similar health policy aims. The cost of medicines should be considered in comparative studies of health and welfare states.

1. Introduction

Healthcare is one of the most important welfare state institutions in terms of both societal and monetary value. In recent years, European societies have experienced particularly rapid growth in health spending because of the various effects of the COVID19-pandemic, the repercussions of Russia's war in Ukraine, and most recently, high inflation (OECD, 2023). Moreover, many European countries have been struggling with financial sustainability long before the pandemic due to population ageing, rapid technological change, and rising public expectations, in the context of slow or no economic growth since the global financial crisis in 2008. Hence, cost containment and efficiency are likely to remain high on the political agenda, with possible trade-offs in terms of equity.

One key concern is the rising cost of new innovative medicines. Among OECD countries, on average, every fifth dollar spent on health is spent on medicines, when hospital use is included (Belloni et al., 2016). As the most common healthcare intervention, medicines are a requirement for functioning healthcare and the cornerstone of treatment of many acute and chronic illnesses, increasingly prevalent among European populations. The key objective of the Pharmaceutical Strategy for Europe (European Commission, 2020) is to ensure patients' access to affordable medicines and the financial sustainability of health systems. Nevertheless, co-payment increases have been common in Europe to draw savings, and these measures often target medicines (Thomson et al., 2015; Vogler et al., 2016).

Due to the deep-rooted health inequalities, those with higher healthcare needs tend to have a lower ability to pay. In the social policy

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literature, this phenomenon is conceptualised as decommodification, defined as occurring when services are rendered a matter of right or when individuals can maintain their livelihood without reliance on the market (Esping-Andersen, 1990). Conceptualisations in healthcare have hitherto been used in studies focusing on healthcare services, particularly hospital beds and access to general practitioners or specialists; however, medicines have not been covered (Bambra, 2005a, 2005b; Reibling, 2010). This study aims to fill this gap in the literature.

In Europe, on average 39% of households report at least some financial burden of medicines, with wide variation across countries from over 80% in Poland, Cyprus, Bulgaria, and Italy, to approximately 10% in France and Norway (Eurostat, 2019). The high variation may implicate limited comparability of a heterogeneous sample of countries. If the prevalence of material deprivation is high, this vulnerability is likely to be reflected in any indicator measuring households' possibilities to satisfy their material needs. Residual and generous welfare states may also differ in what medicines and in which circumstances are considered individual responsibility. Conversely, when financial burden of medicines occurs in the context of generous welfare states with low material deprivation and poverty, it may reveal gaps that undermine otherwise comprehensive social protection.

While both perspectives are worth investigating, the focus of the current study is on the latter. This study examines the market risk related to medicines by comparing five Northern European countries that are relatively similar in terms of their aims and outcomes: Denmark, Finland, the Netherlands, Norway, and Sweden. The five countries have universal health systems with egalitarian aims of providing similar type and quality of treatment to all, regardless of status, income, gender, and other enabling factors. They have low prevalence of unmet needs for medical examination due to costs, suggesting that if financial consequences of ill health exist, they manifest in other ways. Furthermore, all countries fare relatively similarly in terms of low poverty risk and income inequalities.

This study had three specific research questions addressed using country-specific and pooled linear probability models and EU-SILC 2017 microdata.

1. How are income and other individual and household characteristics associated with financial burden of medicines (FBM) in each country? Do age and health modify the association between income and FBM?
2. Do countries differ in respect to question 1?
3. How is FBM associated with the financial burden of medical care, and the unmet need for medical examinations across countries?

The study applies an outcomes perspective (Lohmann and Zagel, 2018), meaning that financial burden of medicines is used as an indicator of potential policy outcomes instead of measuring policies themselves. This choice is conditioned by the scarcity of available comparative data. Categorical and gradual concepts applicable to systematic examinations of differences across countries are largely lacking for pharmaceutical policy. Even broad spending indicators lack comparability because of differences in data coverage and focus on retail sector, the role of which varies across countries (Morgan and Xiang, 2022). Various pharmaceutical system characteristics have been collected cross-sectionally (Vogler et al., 2019a; WHO, 2018); however, we need to understand which features within the full complexity of systems contribute to the policy effects. The current study is envisaged to pave the way for future research in that direction.

The limitation of the outcome perspective is the inability to causally link specific policies to outcomes. However, focus on outcomes rather than institutional features has advantages in terms of acknowledging that financial protection may be achieved in more than one way. Privatisation, marketisation, and public-private mixes have become features of all health systems; thus, the dividing lines between systems do not necessarily lie between institutional features being public or private,

or the extent to which governance relies on competition and regulation (Martinussen and Rydland, 2022; Schrecker and Bambra, 2015; Tynkynen et al., 2018). Privatisation and the use of out-of-pocket payments have been justified by preventing moral hazard, addressing the heterogeneity of preferences, allowing choice, and unburdening the public system (Drummond and Towse, 2012; Kullberg et al., 2022). However, providing private pathways increases the influence of social status and the ability to pay in who has access, under what conditions, and to what services; thus, it affects how healthcare is *de facto* prioritised (Immergut and Schneider, 2020; Kullberg et al., 2019; Lapidus, 2022).

A recent healthcare system analysis focusing on institutional features, access regulation and performance, classified Finland, Norway and Sweden into "performance- and primary-care-oriented public systems", and Denmark and the Netherlands into "regulation-oriented public systems" (Reibling et al., 2019). Both types were characterised by a medium level of resources, predominantly derived from public financing and highly regulated access choice, with the biggest difference between the two clusters being even more pronounced regulation in the latter cluster, together with lower cost sharing. Regarding healthcare access and financial protection, Denmark and the Netherlands ranked among the few European countries where cost-related unmet needs for medical examination or treatment, or for prescribed medicines, were not concentrated among those at the lower end of the income distribution (Carnazza et al., 2023).

Nevertheless, it needs to be noted that the healthcare systems in the Nordic countries and the Netherlands differ by their institutional characteristics. The Nordic countries share a tradition of predominantly tax-funded, Beveridge-style system healthcare systems. In Finland; however, outpatient medicines are reimbursed through Social Insurance, which represents a Bismarckian element (Häkkinen and Lehto, 2005). The Netherlands has traditionally been classified as having a Bismarckian-style health system. Nonetheless, it deviated from this path in 2006, by introducing a regulated competition model that resembled the ideas that Alain Enthoven originally proposed for the United States in the 1970s (Enthoven and Van de Ven, 2007; Jeurissen and Maarse, 2021).

Our study contributes to the literature on health equity and decommodification in four ways. First, it examines the subjective financial burden, which is likely to capture the financial consequences of healthcare in a broader manner than unmet needs and is linked to people's satisfaction with the systems and the costs they face (Schokkaert et al., 2017). Second, it focuses on medicines, which are rarely addressed in social policy literature. Third, it examines how different types of financial hardship related to healthcare overlap and co-vary. Fourth, it examines countries with universal and comprehensive social protection, where the incidence of unmet needs for medical examination tends to be low.

A comparison of five relatively similar countries is expected to provide a policy-relevant benchmark in terms of revealing the level of financial protection that can be achieved through different policies. Comparative evidence on the ability of welfare systems to protect individuals and families from the burden of costs is needed to evaluate the effects of policy changes and learn from the experiences of others. This is increasingly important as all countries face growing difficulties in balancing the economic and social sustainability of their welfare systems and allocating scarce resources fairly.

2. Theory and literature review

2.1. Conceptualising decommodification

An influential conceptualisation of decommodification was proposed by Esping-Andersen (1990); however, the theoretical foundations were laid by others before him, particularly Marshall (1950) and Titmuss (1958).

Following Esping-Andersen's idea of three welfare state regimes, a

large stream of research has focused on policy- or local-level regimes, arguing that not all policy areas within a country necessarily reflect similar characteristics; instead, several regimes and various degrees of de-commodification may coexist within the same welfare state (e.g., Kasza, 2002; Rice, 2013). In healthcare, de-commodification reflects the relationship between an individual's access to healthcare and market position (Bambra, 2005a, 2005b). Bambra's de-commodification index was constructed based on private expenditures, the share of private hospital beds, and the share of the population covered by the public healthcare system. Reibling (2010) focused on the regulation of access and constructed indicators in line with Esping-Andersen's dimensions: gatekeeping (as conditions), cost-sharing (as disincentives), number of doctors (as benefit level), and coverage of health systems (as universality).

Criticism of the regime literature has included the inability to distinguish between effective and potential beneficiaries (Israel and Spannagel, 2019) and the inability of benefit levels to account for differences in the need for or quality of the services provided (Reibling et al., 2019). Furthermore, the different ways in which welfare states provide protections have complementary effects. Generous cash transfers can buffer the negative effects of co-payment increases (Israel, 2016; Farrants et al., 2017; Madureira-Lima et al., 2018; Reeves et al., 2017), and generous transfers in kind can improve households' livelihoods and protect them from poverty (Israel and Spannagel, 2019; Vaalavuo, 2020; Verbist et al., 2012). Thus, the extent to which healthcare access depends on social status and the ability to pay reflects the wider context in which the health system is embedded. Owing to the idiosyncratic nature of countries' economic and social protections, it is difficult to assess the actual realisation of social rights in comparative studies without considering multiple aspects of welfare provision and outcomes simultaneously.

The concept of re-commodification has been used in the context of withdrawal of previous welfare. Increasing re-commodification has been linked with growing health inequalities (measured by self-reported health) between the employed and unemployed in Sweden and England between 1991 and 2011 (Farrants et al., 2016). In Sweden in 1980–2005, educational inequities in visiting a doctor remained relatively stable despite increasing reliance on user charges (Farrants et al., 2017; Farrants and Bambra, 2018).

De-commodification in the context of medicines has not yet been conceptualised in existing research; however, differences in comparison to healthcare services exist. Provision independent of the market is negligible, and waiting times, travel, and time constraints play less of a role in conditioning access. Nevertheless, steering mechanisms are needed because under-, over-, and misuse of medicines is common and can cause harm and inefficiency (Busfield, 2015; Masnoon et al., 2017). Accordingly, a variety of soft and hard governing tools intended to ensure quality, cost containment, and rational use have implications in terms of access, availability, and prescriber and patient behaviour (Morgan and Xiang, 2022; Vogler et al., 2019a; Wettermark et al., 2009; WHO, 2018). Moreover, pricing and reimbursement policies are important for conditioning access, as unregulated market prices of medicines can make them unaffordable even to the well-off (White and Corwin, 2022).

2.2. Approach focusing on outcomes

In recent decades, crises and retrenchments, along with the increasing availability of data, have increased research interest in the outcomes of welfare states, such as poverty, trust, health, and fertility (Nelson et al., 2022). The primary goal of the health system is to promote population health (level or distribution).

The link between welfare state efforts and population health outcomes has been a subject of a large body of research extensively reviewed before (e.g., Brennenstuhl et al., 2012; Bergqvist et al., 2013; Hillier-Brown et al., 2019; Kelly-Irving et al., 2023; Kim, 2019;

Muntaner et al., 2011; Thomson et al., 2018). However, linking healthcare system features with population health outcomes is less straightforward because healthcare is only one of the ways in which welfare states affect the distribution of the determinants of health (Whitehead and Dahlgren, 2006). Therefore, inequality assessments in healthcare context commonly rely on intermediate outcomes such as access. Access is multidimensional and includes but is not limited to the dimensions of availability, affordability, acceptability, and accessibility (Levesque et al., 2013). These dimensions overlap with the two other intrinsic health system goals besides health, which are fairness of financing and responsiveness. The former implies that access to quality healthcare is available to all based on need without financial hardship. The latter includes aspects of fulfilling individuals' legitimate expectations, safeguarding their rights their experiences of interactions, and aspects related to institutional arrangements, such as how priorities are set (Mirzoev and Kane, 2017).

In social policy research, equity outcomes in healthcare are typically measured in terms of unmet needs (for medical examinations). This can be considered an application of *living standards* approach used, for example, in the comparative welfare state literature on poverty (Veenhoven, 2002). Another approach, applying methods from *poverty-line* studies (Townsend, 1954), measures catastrophic or impoverishing health spending (Thomson et al., 2019). The third approach, by applying indicators of *social citizenship* (Scruggs and Allan, 2006), calculates the costs of specific products or baskets of products in relation to model family incomes (Vogler et al., 2019b). All approaches have limitations, including selecting items and model families, and setting relevant thresholds; thus, they complement each other.

This study examines the subjective financial burden surveyed in the EU-SILC 2017 ad hoc module, used to test questions as part of the development of the EU-SILC health module (Demarest and Charafeddine, 2022). Only a few studies have analytically used these variables (e.g., Vojvodic et al., 2022). The indicator of subjective financial burden is not without limitations; however, it is envisaged to complement the abovementioned approaches and be more sensitive in comparing market risk in countries with comprehensive welfare states where unmet needs and catastrophic healthcare costs are rare. In contrast to unmet needs, subjective financial burden captures situations where people use healthcare goods and services but experience financial hardship as consequence. In relation to catastrophic or (further) impoverishing health spending, subjective financial burden reflects the lived experiences of people which may differ from the set thresholds.

2.3. Hypotheses for country comparison

All five countries use co-payments for medicines (Table 1), although a large body of evidence suggests that out-of-pocket costs are a regressive form of financing (Thomson et al., 2019; Wagstaff et al., 1992). Thus, we hypothesised, that *lower income is associated with higher probability of FBM in all countries (H1)*. These countries use various policies to protect vulnerable population groups from accumulating costs. *We expect that the strength of these protective policies is reflected in the extent to which the association between income and FBM is modified by proxies of higher need, that is, older age and higher morbidity (H2)*. While aggregate statistics show that unmet needs are less common than the financial burden, we expect that *FBM is associated with financial burden of medical care and unmet needs for medical examination (H3)*.

3. Data and methodology

Data: The analyses were based on EU-SILC microdata from 2017. In the countries included in our analysis, data were partly collected from registers, and personal interview data were collected from the sampled person only (Wirth and Pffor, 2022). This means that while the financial burden relates to the entire household, several other variables are only available for the household reference person. In this study, we used

Table 1
Co-payments for outpatient medicines in 2017.

Country	Co-payment policies for government/compulsory reimbursement schemes
Denmark	Full cost OOP up to accumulation of €126 co-payment (annual deductible), after which gradually increasing reimbursement by increasing expenditure (50%/75%/85%) up to annual accumulative co-payment ceiling of €522, then 100% reimbursement may apply. Higher initial reimbursement rate for persons aged <18 years; further subsidies to residents who cannot afford to pay; municipalities can cover part of co-payments for low-income pensioners.
Finland	Full costs OOP up to accumulation of €50 co-payment (annual deductible), then depending on the product and disease, 60% (basic) co-payment, 35% reduced co-payment (specific chronic/severe conditions), or €4.50 fixed prescription fee (specific chronic/severe conditions), up to annual accumulation of co-payments ceiling of €605, after which €2.50 fixed prescription charge applies. Persons aged ≤18 years exempt from deductible.
The Netherlands	Full costs OOP up to €358 annual cumulative health insurance deductible including all healthcare and basic package medicines (optionally deductible can be increased up to €500 for lower insurance premiums). Deductible may not be charged for insurer listed preferred medicines. Additional co-payments may apply for medicines outside basic package and preferred list. Persons aged <18 years exempt from deductible.
Norway	Less important medicines paid in full OOP up to accumulative co-payment of €196 per year, after which 90% refund may apply. For important medicines, 39% co-payment up to max €56 per dispensing. Low-income pensioners and persons aged <16 years exempt from co-payments for important medicines.
Sweden	Full cost OOP up to accumulation of €117 co-payment (deductible for running 12-month period), after which gradually increasing reimbursement by increasing expenditure (50%/75%/90%) up to accumulative co-payment ceiling of €233, then 100% reimbursement until the end of 12 months since the first purchase. Persons aged <18 years exempt from some of the co-payments.

OOP = out-of-pocket. Table was compiled by the Authors based on data from EU's Mutual Information System on Social Protection (MISSOC, www.missoc.org) Database (January 2017) and (Kroneman et al., 2016) <https://apps.who.int/iris/handle/10665/330244>

households as the unit of analysis; however, we used some individual-level-variables as proxies for households.

Study population: We included all households with no missing data on the variables used in the analyses. The pooled study population comprised 40,415 households (Table 2). Country variable was used as a moderator in the pooled models.

Outcome variable: Our main outcome variable was the financial burden of medicines (FBM), which indicated whether the household has

experienced heavy, somewhat, or no financial burden for medicines during the preceding 12 months. Additional information indicated whether no one in the household needed or used any medicines.

Denmark and the Netherlands had a notably larger share of households that indicated no need or use (19% and 10%, respectively) than other countries (3–5%). Given the magnitude of the difference between the countries, this self-reported need is unlikely to reliably reflect differences in medical need. Possible explanations include cultural differences in reporting or using medicines. Differences may also be due to unnecessary purchasing and using of products that people have no medical need for. For example, advertising prescription medicines to the general public is prohibited in Europe; however, a plethora of other measures are used to promote the sales of prescription and over-the-counter medicines as well as other products with health claims (Alves et al., 2019). The literature on financial protection in healthcare suggests that health systems should take responsibility of all costs for people, even when use is unnecessary, ineffective or inappropriate (Thomson et al., 2019). Accordingly, in this study, decommodification is understood to incorporate mechanisms that promote the rational use of medicines.

To further test this assumption, the association between non-need and population characteristics were tested using a linear probability model (Table S1 in Supplemental Data). The probability of reporting non-use was most strongly associated with reference persons' lack of health problems and younger age, whereas the associations with income and education were weak or non-significant. Hence, FBM, or the lack thereof, was assumed to also reflect patterns related to underuse or overuse, disregard of which would overestimate FBM in countries that perform well in terms of rational use. Therefore, all households regardless of whether they indicated need for medicines were included. The main outcome variable was constructed as follows: 0 = No FBM or no need for or no use; and 1 = heavy or somewhat FBM.

Similar dichotomised variables were constructed for the financial burden of medical care and unmet needs for medical examination; however, acknowledging that unmet needs were only asked of the selected household member (0 = No, there was no occasion when the reference person really needed examination or treatment but did not receive it, or the person did not really need any medical examination or treatment; 1 = Yes, there was at least one occasion when the reference person really needed examination or treatment but did not receive it).

Income: Equivalised disposable income, calculated as total disposable household income (income after taxes and benefits) divided by the number of equivalised household sizes (using the OECD modified equivalence scale), was used to classify households into income quintiles by country based on the income distribution in the EU-SILC sample

Table 2
Characteristics of the households by country (% of study population), unadjusted.

	Denmark	Finland	Netherlands	Norway	Sweden	Total
Full sample, N	5907	10,210	13,328	6273	5928	41,646
Excluded, % of full sample ^a	1.4	1.8	3.5	5.8	2.3	3.0
Total study population, N	5822	10,023	12,868	5909	5793	40,415
<i>Reference person characteristics</i>						
Sex: male	48.3	51.1	44.8	50.9	49.4	48.4
Age: <45	29.4	38.0	31.5	41.9	37.8	35.3
Age: 45-64	36.2	37.9	39.8	34.9	32.2	37.0
Age: 65+	34.3	24.1	28.7	23.2	30.0	27.8
Health problems: none	58.5	48.5	55.8	63.2	61.1	56.2
Health problems: yes, some	17.5	24.7	17.9	22.3	27.7	21.6
Health problems: yes, high	24.1	26.8	26.4	14.4	11.3	22.2
<i>Household characteristics</i>						
Education: low	13.1	9.9	18.2	10.1	12.2	13.4
Education: medium	39.3	37.4	37.0	34.5	31.6	36.3
Education: high	47.6	52.7	44.8	55.4	56.2	50.3
Household structure: single/single parent	34.3	27.1	38.9	30.2	27.4	32.4
Immigrants in household: yes	7.6	6.2	9.9	14.0	20.3	10.7

^a Excluded because of missing data on dependent or independent variables.

(households with income below zero were excluded, $N = 82$).

Individual-level characteristics (proxies for household): Self-reported measures of health were available only for the sampled household members, and general health had a relatively high share of missing data in Finland. Thus, we used the reference person's chronic illness or condition and/or limitation of activities as a proxy for household health problems (0 = none; 1 = chronic illness or non-strong limitation; 2 = chronic illness and non-strong limitation, or strong limitation). As health status refers to the reference person, we used the reference person's age at the end of the income reference period and sex as control variables.

Household-level characteristics: Knowledge of healthcare and social policy systems are important factors determining access; thus, we adjusted for immigrant members in households and the highest level of education (International Standard Classification of Education [ISCED]) achieved among household members aged 16 and over (1 = max lower secondary, 2 = upper secondary, 3 = post-secondary or higher). We also adjusted by household composition classified into 1 = single person/single parent, and 2 = other.

Methods: We used country-specific and pooled linear probability models, regressing FBM on income (categorised into quintiles to reveal non-linearities) and controlling for household characteristics (highest education, household structure, immigrants) and reference person's characteristics (gender, age, and health problems). In the pooled models, we included country variable as moderator, to account for the nested structure of the data, and to control for country-level variation (McNeish and Stapleton, 2016; Möhring, 2012). Of note, since we only included five non-randomly selected higher-level units, we do not aim to estimate context effects exploiting cross-level interactions (interactions between contextual variables that vary at the country level and lower-level variables) (Heisig and Schaeffer, 2019).

Linear probability models have advantages over non-linear models in terms of interpretability, particularly when interaction effects are included (Gomila, 2021). In the country-specific models, the interaction effects were examined in terms of how health and age modified the effects of income. In the pooled models, interactions were used in terms of how the effects of income, age, and health varied by country and net of other characteristics.

Furthermore, separate pooled models were used to examine the association between FBM and a) financial burden of medical care, and b) unmet needs for medical examination. The results are presented as predicted probabilities and average marginal effects (AME), with testing for statistically significant differences (Wald-test). All analyses were conducted using Stata 17.0 software (Stata Corporation, College Station, TX, USA), using packages *estout* (Jann, 2005), *spost13_ado* (Long and Freese, 2013), *mplotoffset* (Winter, 2017), and *grc1leg2* (Cox, 2020); and stata syntax for EU-SILC data handling and pooling (Pffor and Jung, 2022). The EU-SILC household cross-sectional weights were used in all analyses (DB090). To account for the heteroscedasticity the method implies, robust standard errors were estimated.

4. Results

Before reporting the results of the multivariate models, the proportions and overlaps between different types of hardship indicators were examined (Table 3). Overall, FBM was more common than the financial burden for medical care in all the countries except Norway. Both were most commonly reported in Finland, where a fourth of the households reported facing both compared to a tenth in Norway and Sweden, and 5% in Denmark. FBM was least commonly reported in Norway, where it also predominantly co-occurred with burden of care (only 3% reported FBM without burden of care). Unmet needs for medical examination or treatment had rarely been reported in any country; and, of note, only rarely or never due to costs.

Table 3

Proportions of households reporting financial burden of medicines (FBM), financial burden of medical care, and unmet needs for medical examination or treatment, with overlap of FBM and other types of hardship, and FBM by income quintile, by country, %, weighted.

	Denmark	Finland	Netherlands	Norway	Sweden
FBM	13.6	40.2	25.2	12.3	21.9
Burden of medical care	10.1	32.9	23.4	16.3	13.6
Unmet needs	8.1	4.8	0.5	2.7	4.0
<i>Overlap between FBM and other hardship</i>					
Only FBM	7.3	13.8	9.3	2.7	11.4
FBM and burden of medical care	5.3	25.7	15.8	9.5	9.9
FBM and unmet needs	2.3	3.3	0.2	1.2	1.8
<i>FBM by income quintile</i>					
I (lowest)	19.3	49.4	40.1	21.8	35.9
II	17.8	45.7	36.2	14.9	22.7
III	12.5	39.0	21.4	9.6	17.7
IV	7.6	33.0	14.9	4.9	13.8
V (highest)	4.4	22.0	8.3	3.3	8.5

4.1. Country-specific models

Lower income and more health problems were associated with FBM in all countries, net of other characteristics (Table S2–S6 in supplemental data). Age was positively associated with FBM in Finland, while in Denmark and the Netherlands mid-aged (45–64 years) had increased probability in comparison to the youngest (<45 years) and in Norway oldest (≥ 65 years) had lower probability than the youngest with no significant difference between the young and mid-aged. In Sweden, no statistically significant differences were observed between age groups.

To further examine the extent to which age and health status modify the effect of income, these interaction terms were added to the models (Table S2–S6 in supplemental data). In Finland, the oldest age group had a higher probability of FBM throughout the income distribution, whereas in other countries, the middle-aged group tended to have the highest exposure (Fig. 1). Thus, countries differed in the extent to which the oldest age group was protected from FBM. Conversely, the reference person's higher health problems increased the probability of FBM in all countries, and the effect of health tended to be more pronounced at the lower end of the income distribution (Fig. 2).

4.2. Pooled models

Fig. 3 shows how the effect of income varies across countries, net of other characteristics (also Table S7 and Fig. S8 in supplemental data). The probability of FBM was the highest in Finland throughout the income distribution; however, in the lowest quintile, the probability was not significantly different from that in the Netherlands. Denmark and Norway had low probabilities in all quintiles, whereas the Netherlands and Sweden mostly fell in between. While all countries presented some income gradients, an examination of AMEs showed that the gradient was steepest in the Netherlands (Fig. S8 in supplemental data).

The probability of FBM was highest in Finland and lowest in Denmark and Norway in each age group and health status group (Fig. S9 in supplemental data). In terms of age, Finland is separated from the rest by the increasing probability of financial burden by increasing age, whereas in other countries, the association seems more curvilinear. Households in which the reference person reported high health problems had a high probability of FBM in Finland (over 60%) and in other countries (between 30% and 50%).

Finally, the associations between FBM and other types of financial hardship related to healthcare were examined using pooled models adjusted for differences across countries in reference persons' and households' characteristics, excluding health, to avoid multicollinearity

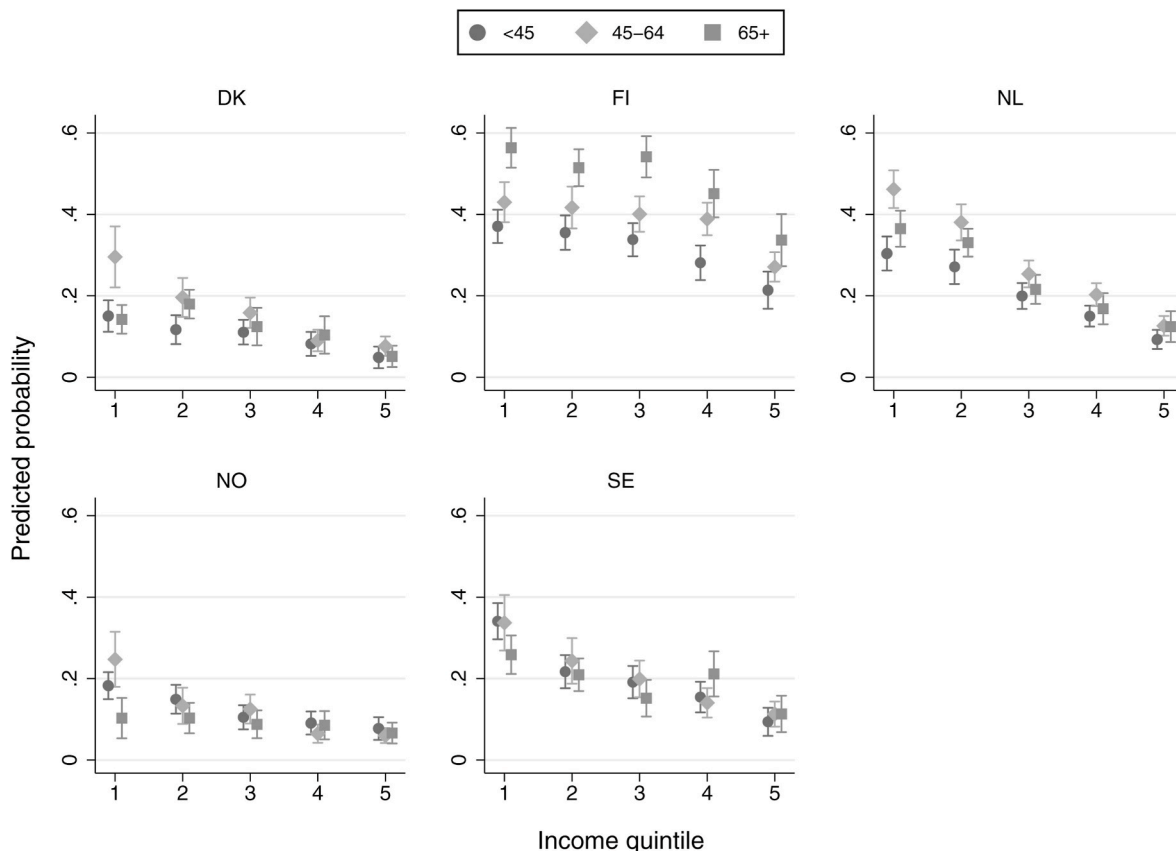


Fig. 1. Predicted probabilities (with 95% confidence intervals) of financial burden of medicines in Denmark (DE), Finland (FI), the Netherlands (NL), Norway (NO), and Sweden (SE), by income quintile and age group. Results are based on country-specific linear probability models, with interactions age X income and health X income. Adjusted by: Reference person's gender, household structure, immigration status, highest education.

(Table S10–S11 in supplemental data). The financial burden of medical care was strongly associated with FBM, with those reporting a burden of medical care having approximately 50 percentage points (pp) higher probability of reporting FBM (Fig. 4). However, this association was weaker in Denmark. Unmet needs were rare in all countries and the effect sizes were hence smaller.

5. Discussion and conclusions

In this study, we applied an outcome perspective to examine the decommodification of medicines through the level and distribution of FBM in five Northern European countries with comprehensive social protection. Our approach links the perspectives of economic well-being and financial protection in healthcare, revealing several important findings not captured in previous research.

First, country-specific examinations were in line with our hypothesis (H1), showing that FBM was associated with lower income in all countries, reflecting the commodification of medicines, likely due to the existence of co-payments and gaps in coverage, such as medicines outside the benefit package and self-prescribed medicines (over-the-counter). Subjective financial burden seemed more sensitive in capturing manifestations of inadequate access to healthcare than unmet needs. However, it may also reflect dissatisfaction towards costs, even when they would not cause severe economic hardship to the individual. Dissatisfaction may affect the system's legitimacy. Moreover, households' spending on healthcare goods and services is generally disregarded in analyses of social protection, income distribution, and poverty; thus, there is a lack of evidence of their effects on households' finances. This may affect our understanding of economic well-being in lower-income groups, particularly because low-income individuals are

more likely to suffer from health problems and require healthcare.

Accordingly, in all countries, health problems increased the risk of FBM, with larger income differences at the lower end of the income distribution. In relation to our hypothesis (H2), this finding suggests inadequacies in protecting those in double jeopardy (low-income and health problems) from the burden of medicine costs in all countries. In terms of protecting older individuals from the burden of costs, Finland fared worse than other countries. Because we controlled for household income in the analyses, these findings should not be driven by differences in old age poverty. Nevertheless, the severe material or social deprivation rate among the population aged 65 years and older was highest in Finland (1.7% vs. 0.3–1.3%). Conversely, at-risk-of-poverty rate (AROP) and relative median poverty risk gap for this age group were highest in Sweden.

The high burden of healthcare payments among older adults in Finland aligns with previous research (Aaltonen et al., 2023), while it has also been argued that patient payments are still small in relation to the total value of healthcare used (Vaalavuo, 2020), and that older adults rarely forgo medicines, medical care, or food due to cost (Aaltonen, 2023). Hence, our results complement the Finnish debate by showing that older adults face high exposure to subjective financial burden compared to their counterparts in other Northern European countries.

Second, although not able to statistically test contextual effects, the pooled analyses allow comparison of FBM across countries net of population characteristics. The relative ranking differs to some extent from what could have been expected based on prior evidence. Higher out-of-pocket spending tends to correlate with a higher incidence of catastrophic health spending, which is generally concentrated towards the lower end of the income spectrum. Among the examined countries,

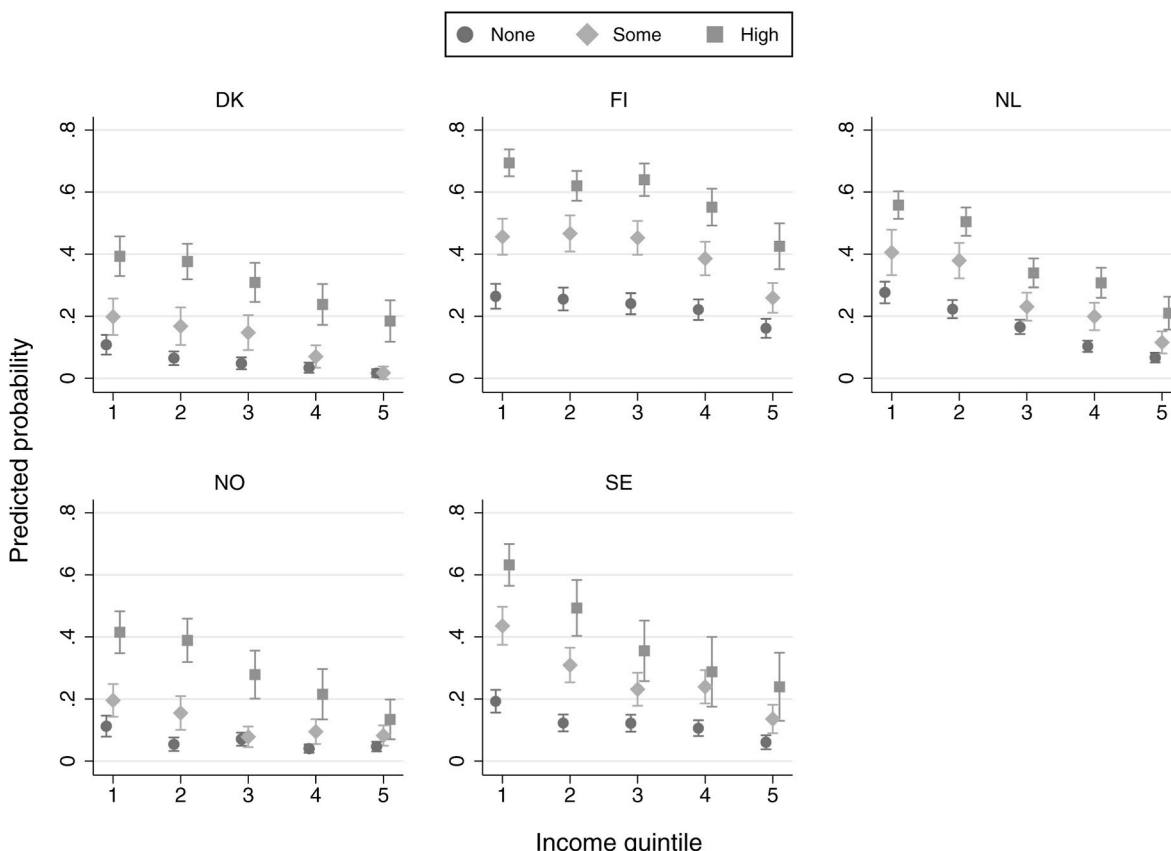


Fig. 2. Predicted probabilities (with 95% confidence intervals) of FBM in Denmark (DE), Finland (FI), the Netherlands (NL), Norway (NO), and Sweden (SE), by income quintile and health problems (None/Some health problems/High health problems). Results are based on country-specific linear probability models, with interactions age X income and health X income. Adjusted by: Reference person’s gender, household structure, immigration status, highest education.

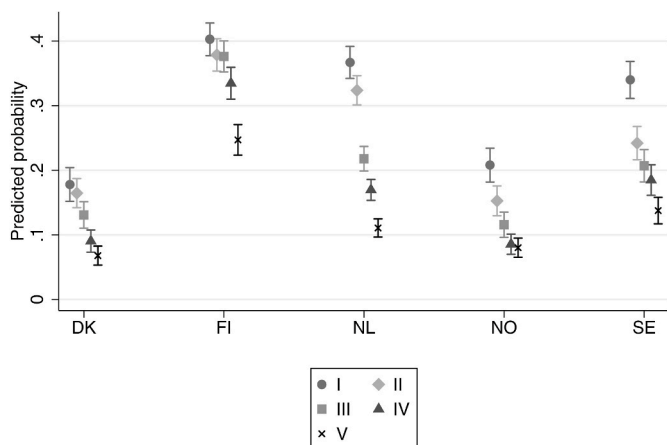


Fig. 3. Predicted probability (with 95% confidence interval) of financial burden of medicines by country and income quintile (legend). Results are based on a pooled linear probability model with interactions age X country, health X country, and income X country. Models were adjusted for reference person’s gender, household structure, immigration status, and highest education.

Finland had the highest household out-of-pocket financing share of health expenditure (20%), while the Netherlands had the lowest (11%), with Denmark, Norway (both 14%), and Sweden (15%) falling in between (OECD/European Union, 2018). Accordingly, the level of FBM remained markedly higher in Finland than in other countries after adjusting for other characteristics.

Unexpectedly, the FBM was relatively strongly associated with

income in the Netherlands, despite the low OOP share of health expenditure and the high emphasis on healthcare access regulation, which could also imply more rational prescribing patterns (Reibling et al., 2019). This finding does not seem to be explained by deeper poverty as the Netherlands has the second-lowest median poverty risk gap among the five countries (Eurostat indicator TESSIO30). A possible explanation is the managed-competition private health insurance system which differs from the logic of systems in Nordic countries. While regulations are set to prevent non-take up and selection of clients among insurance companies, gaps in coverage may exist in the form of medicines outside the basic package and for medicines that are not on the insurers’ preferred list. Previous studies have shown a social gradient of choice errors, indicating that highly educated individuals seem more likely to make better choices in terms of insurance policies (Handel et al., 2020; Van Winssen et al., 2016). While citizens acknowledge the importance of choices, many find it difficult to understand insurance information (Holst et al., 2021), and may not feel free to switch insurance (Duijmelingk et al., 2015). Choice errors may also explain why higher education had a relatively large protective effect against FBM in the Netherlands.

Conversely, Denmark seemed to perform relatively well in terms of the low-level and weak income gradient of FBM, in line with its low OOP share and high access regulation (Reibling et al., 2019). A distinguishing feature of the Danish system is its high share of centrally procured medicines, and most advanced medicines are restricted to hospital use (Christensen et al., 2022). In Finland and Sweden, the retail sector accounts for over 80% of the pharmaceutical spending, whereas in Denmark, this figure is only 50% (Morgan and Xiang, 2022). The centralised procurement may extend access regulations to medicines, prevent irrational use, and limit exposure to co-payments, particularly in

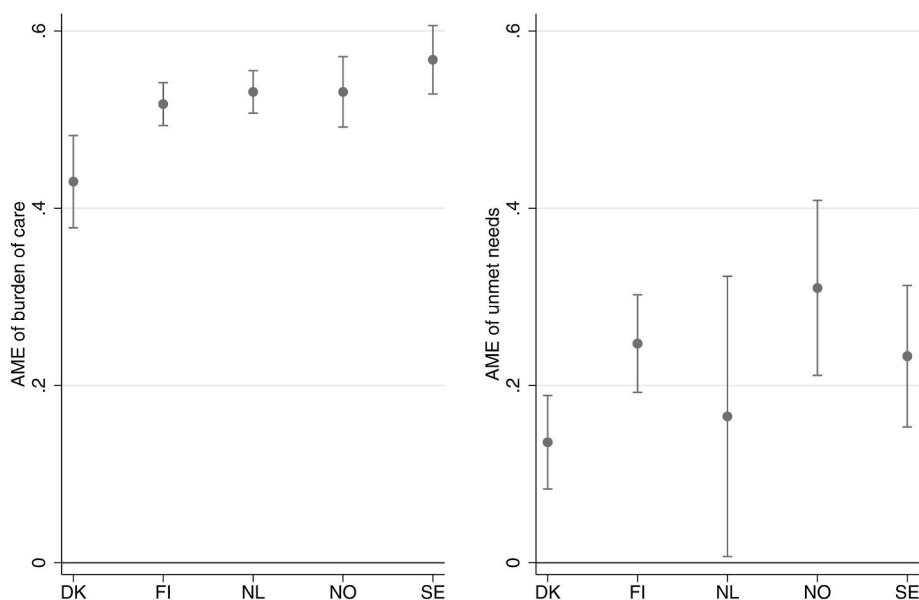


Fig. 4. Average marginal effects (AME) of financial burden of medical care (left panel), and unmet needs for medical examination (right panel) on financial burden of medicines. Results are based on a pooled linear probability models with interactions between country and burden of medical care/unmet needs. Adjusted by: Reference person's gender, age, household structure, income quintile, immigration status, highest education.

terms of high-cost therapies.

Norway, having a similar OOP share of financing as Sweden and Denmark, performed well in terms of level and distribution and particularly protected older adults from FBM, which may be attributed to the co-payment exemption targeted to low-income pensionaries. However, other gaps in coverage may be more important in Norway, as FBM was less prevalent than, and often co-occurred with financial burden of medical care.

The higher exposure to FBM in Sweden than in Denmark and Norway may be attributed to the larger size of the retail sector (in contrast to Denmark) and the co-payment structure (in contrast to Norway). The Swedish expenditure-based co-payment model required patients to pay up to €117 as deductible before gradually increasing the reimbursements applied (Table 1). In Norway, co-payments were capped per dispensing, with exemptions to low-income pensioners. Thus, exposure to retail-sector co-payments, the level of spending, and how this spending is distributed throughout the year are possible explanations for the observed differences.

As a methodological finding, FBM tended to be more common than financial hardship related to healthcare services. While the two indicators were strongly associated, it was not uncommon for households to report only one type of hardship. Therefore, examining the exposure to market risk requires extending the focus beyond access to specific services. Unmet needs, at least in the manner in which they are surveyed in the EU-SILC, seem to lack sensitivity in examining equity in the compared countries, which may be due to several reasons, including but not limited to: focusing on medical examination only, allowing one main reason only, disregarding other coping strategies besides forgoing care, and interviewing only one person in the household (OECD, 2020; Wirth and Pforr, 2022).

Few caveats need to be noted. First, the outcome of financial burden of medicines disregarded unmet needs; thus, economic consequences may have been underestimated. However, data that would simultaneously encompass both aspects were not currently available. Second, the study included only five countries; thus, it was not possible to examine the effects of macro-level contextual variables. Future studies, using a larger number of countries, could address these questions. However, financial burden may not be able to capture income gradient across a heterogeneous sample of countries. Third, the pooled statistical models may have not captured all possible confounders that could have

contributed to the observed differences across countries. Nevertheless, the models provided confidence over that the differences in FBM across countries persisted after controlling for sociodemographic characteristics.

Overall, our examination of five countries with similar egalitarian goals suggests differential exposure of patients to market risks related to medicines. Beyond household shares of financing, differences in distribution pathways and the structure of co-payments are among the possible explanations for these observed differences. Further studies and better institutional data are needed, to examine how European welfare states enable equitable access to affordable medicines for their residents and which policy mixes and under what circumstances are effective. When facing difficult choices in balancing economic and social sustainability, European countries should consider multiple aspects of welfare provision that affect the realisation of social rights. Cost sharing is widely used in Europe, and our results highlight that it may undermine comprehensive social protection.

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Declaration of generative AI in scientific writing

None.

CRediT authorship contribution statement

Katri Aaltonen: Writing - review & editing, Writing - original draft, Visualization, Methodology, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Maria Vaalavuo:** Writing - review & editing, Supervision, Conceptualization.

Data availability

Microdata were used by permission RPP 24/2021-EU-SILC. Data are

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.socscimed.2024.116799>.

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