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Can Health Outcomes and Inequalities be Improved While Containing Costs? The Role of Voluntary Health Insurance in Universal Health Care Systems in the OECD

Paige Bristow
Ursinus College, pabristow@ursinus.edu

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Abstract

While European countries have improved health outcomes through universal healthcare systems (UHC), they also face pressures to contain the high cost of these systems. In order to control expenses, governments have reduced services covered under UHC and increased co-payments. Voluntary health insurance (VHI) can help cover gaps in publicly financed health coverage, but this is not affordable for all. Since people with higher socioeconomic status are more likely to have VHI and medical providers are incentivized to prioritize people with VHI, VHI tends to exacerbate inequalities in access to health care. Similarly, high out-of-pocket costs worsen healthcare. This research focuses on the relationship between VHI and health outcomes for both men and women in UHC systems within the OECD. Qualitative analysis of healthcare systems in Latvia, Poland, Sweden, and the Netherlands shows that countries with higher rates of participation in voluntary private insurance experience higher gender inequality in health outcomes than those with lower rates of participation. Empirical analysis of the effect of voluntary health insurance on differences in infectious disease rates and non-communicable disease rates by gender, and maternal mortality throughout the OECD shows no clear significant relationship between health outcomes and VHI. Findings from this research suggest that health outcomes and inequalities can be improved by reducing reliance on out-of-pocket costs and addressing socioeconomic inequalities, including gender inequality, through greater public coverage.

Introduction

International organizations such as the United Nations have placed an increased emphasis on better access to medical care. The 2015 Sustainable Development Goals urge countries to adopt universal health coverage by 2030 (United Nations 2015). Universal health coverage requires countries to provide affordable access to medical care, including treatment and prevention services, as well as medications and vaccines for all. The United States remains the only OECD country that does not guarantee medical care for all who need it. In comparison, most OECD countries not only have better domestic health outcomes than the US, but also spend less on health care (Peter G. Peterson Foundation 2022). Universal coverage comes in a variety of forms. In some countries, the government finances and provides the healthcare. Other universal coverage utilizes private doctors, hospitals, and insurance plans, with the government subsidizing coverage for those who would not be able to afford coverage otherwise. Regardless of the exact structure, universal health systems rank ahead of the US in terms of affordability, efficiency, equity, and outcomes (Schneider et al. 2021). Even though the universal health systems rank highly, social inequalities, including gender inequalities, are not erased.

Within established universal coverage systems, financial pressures to reduce government spending have led to reformed healthcare systems to expand the role of the private sector in healthcare. Healthcare costs are high and rising; in most OECD countries, health care spending has increased regardless of the healthcare system. This was displayed by the biggest increases being seen in the United States, Norway, and Sweden, each of which has a very different health care system (Hagist and Kotlikoff 2009). Within OECD countries, aging populations require more medical care and raise expenses. In addition, efforts to contain costs stem from political support for neoliberal economic policies beginning in the 1970s; these policies advocated for

decreased spending on welfare programs and increased the role of the private sector. National healthcare expenditures can be decreased by decreasing the number of services covered under universal health coverage and increasing out-of-pocket payments. Gaps in publicly financed health coverage can create a market for voluntary health insurance (VHI), which individuals may purchase to cover services that are excluded or only partially covered by publicly financed plans (complementary VHI) or to benefit from faster access to treatment and enhanced choice of health care provider (supplementary VHI). Policy analysts have suggested that VHI can help meet the population's health needs and offer greater financial protection than out-of-pocket payments, although they also acknowledge that it may undermine other health-system goals, including equitable access (Sagan and Thomson). Understanding the effect of different systems on health outcomes and gender equity requires examining representative models of different systems; comparative policy analysis of the strengths and weaknesses of different approaches is valuable.

Throughout Europe, nearly all countries have adopted universal health care systems nationalizing access to health services. As T.R. Reid stated, "we cover everybody, but we don't cover everything" (Reid 2010); national public health insurance does not necessarily cover user fees or out-of-pocket expenditures so that on average, patients must cover 30% of health expenditures on their own (Baggio et.al. 2018). Some of these countries also allow residents to purchase voluntary private insurance coverage to cover these costs. Unlike the compulsory health insurance provided by the government, voluntary health insurance is purchased by individuals, families, or private employers and may influence health outcomes in relation to mandated health coverage. Mathaer and Kutzin distinguish three such roles:

- Substitutive VHI covers population groups that are excluded from publicly financed coverage or allowed to take their mandatory contributions out of the compulsory insurance system ("opting out").

- Complementary VHI pays for some of the costs for services that are covered by the statutory system (typically patient co-payments … [or] pays for services that are explicitly excluded from the statutory system's package of benefits.
- Supplementary VHI provides enhanced access (e.g., jumping queues/waiting lines), a higher level of inpatient amenities or greater user choice of providers in comparison to those covered by the statutory system." (Mathauer and Kutzin 2018).

Countries in which VHI accounts for a higher percentage of total health expenditure have larger income inequalities since complementary and supplementary VHI is usually purchased by wealthier individuals who can afford extra premiums (Mathauer and Kutzin 2018). Since VHI comes with an extra cost, wealthier individuals have an advantage in receiving additional, potentially higher quality health services. On top of the benefits of the VHI, wealthier individuals have greater access to resources to live a healthier lifestyle, such as healthier food choices or fitness opportunities. This is what produces health inequalities since citizens with voluntary private insurance have lower risk of death, disability, and depression than citizens without. This raises concerns regarding the true benefit of universal healthcare systems (Baggio et al. 2018). Other concerns include "once a VHI market is in place providing coverage to parts of the (usually better-off) population, vested interests may make it more difficult to introduce or expand publicly funded mechanisms to expand coverage to the wider population, including poorer people" (Mathauer and Kutzin 2018). Socioeconomic and racial factors often contribute to the lack of affordability of voluntary private insurance. Research ties socioeconomics and race to negative health outcomes due to the combined effect of inadequate insurance coverage along with added stressors increasing health conditions such as heart disease (Schulman et al. 1995). Gender equality is recognized as another important influence on the quality of public healthcare systems and health outcomes, but experts differ on its effects. Some report that increasing gender equality is associated with improvements in overall levels of public health (Kawachi et. al.

1999), while others have found that gender equality may produce worse health outcomes for women due to the double burden they face when they take on traditionally male occupations while continuing to have disproportionate responsibilities in the home (Backhans et. al. 2007). This leads to important questions about the best type of universal healthcare system. In a recent study, Australian public health experts found that greater gender equality has a mostly positive effect on the health of males and females, but men's health gains remain limited by continued adherence to traditionally masculine behaviors that encourage unhealthy, risky behaviors (King et. al. 2020).

This research evaluates gender inequality in health outcomes within universal healthcare systems and how voluntary health insurance impacts inequalities in OECD countries. This research qualitatively analyzes case studies of the OECD health systems for Latvia, Poland, Sweden, and the Netherlands, which have four specific health categories. These categories include established social health insurance systems, predominantly tax-financed systems, systems which switched from social health insurance systems to universal tax-financed systems since 1960, and post-communist countries with redeveloped social health insurance systems. Though all these countries have universal healthcare systems, they vary in terms of the degree to which citizens are expected to rely on voluntary private insurance and out-of-pocket costs. This research aims to identify the effects which policy has on health outcomes and specifically if these policies fuel any sex-based inequalities.

This research hypothesized that in a comparison of OECD countries, those with higher rates of participation in voluntary private insurance and higher out-of-pocket spending experience higher inequality in health outcomes than those with lower rates of participation. Particularly, countries with greater voluntary health insurance participation will experience

worse health outcomes for women due to the inequality. Health inequalities are defined here as poorer health outcomes due to gender inequality, the elemental cause of which is gendered relations of power; that is, societal structures that organize and underpin lives based on whether one is male or female (King et al. 2020).

This hypothesis will be quantitatively tested through a linear regression analysis. Six regressions were performed with the difference between male and female cardiovascular disease mortality rate, difference between male and female infectious disease mortality rate, and maternal mortality as the dependent variables. The independent variables include the voluntary health insurance rate, the gender inequality index, and the logarithmic value of GDP per capita. This research aims to identify the impact which voluntary health insurance has on health outcomes. A non-zero relationship between voluntary health insurance and health outcome inequalities would show that voluntary health insurance exacerbates sex-based inequalities regardless of the specific health system. An insignificant relationship could potentially insinuate that other characteristics of the health system influence health inequalities more than voluntary health insurance participation does.

Qualitatively, this paper identifies trends that countries with more extensive universal healthcare coverage have fewer inequalities and better overall health outcomes relative to systems that provide more limited coverage, forcing individuals to rely more heavily on voluntary private insurance and out-of-pocket payments. The quantitative linear regression analysis measured the relationship between voluntary health insurance participation, the gender inequality index, the logarithmic value of GDP per capita and inequalities in non-communicable disease mortality, infectious disease mortality, and maternal mortality. The regression found no significant relationships between inequalities in cardiovascular mortality and the independent

variables. Voluntary health insurance had no statistically significant relationship on infectious diseases. A relationship different from zero was measured between the gender inequality index and the logarithmic value of GDP per capita on the inequalities between men and women for infectious disease mortality. The effect of voluntary health insurance on inequalities within infectious disease mortality was insignificant. When including the gender inequality index, both voluntary health insurance and the gender inequality index had statistically significant t values in relationship to maternal mortality. The VHI coefficient did not have a significant relationship on maternal mortality when the gender inequality index.

Literature Review

Given financial pressures, social inequalities, aging populations and increasing rates of chronic disease, it is important to analyze the approaches that different countries have taken to meet these challenges. This is especially true considering the global COVID-19 pandemic. The pandemic challenged the resources of all health care systems globally but encouraged researchers to further work to identify the best overall system for supporting public health.

Studies on the benefits of public vs. private healthcare

All advanced industrial countries within the OECD, besides the United States, have adopted healthcare systems that provide universal health coverage. This raises arguments regarding the benefits of publicly vs privately financed health systems. In taxpayer financed systems like the United Kingdom, hospitals and community health services are public and medical specialists are government employees. General practitioners are private but are paid under national contracts with the National Health Service. The mix of public and private health care means that physicians in national health systems may work in both public and private practices. In an analysis of the function of this mixed system, researchers found mixed health care systems to be favorable only if there is a high level of competition among private sector physicians and public vs private treatments are seen as imperfect substitutes of each other by the patient (Brekke and Sorgard 2006: 594). The market power of more competition reduces the private sector welfare loss and reduces the overspread of physicians, and the systems must be comparable as patient consumerism fuels the private system. The health authority also must be concerned with physician profits as parallel health systems draw physicians to work in both to

make more money (Brekke and Sorgard 2006: 594). Brekke and Sorgard found that wage increases in the public sector reduced the need for physicians to work in both sectors, but it relied on a weaker private sector to reduce the draw away from public health care. This article suggests that mixed healthcare systems are desirable under these stated conditions because they prevent overcrowding from reducing the number of physicians working in the public sector and limit the cost of health care (Brekke and Sorgard 2006: 594).

In contrast to countries where the healthcare system is financed by general taxation or mandated contributions, the U.S. healthcare system is largely privately owned, and hospitals and healthcare facilities are for-profit. Private systems rely on free-market competition among insurance companies as well as healthcare providers and medical institutions. Advocates of private systems argue that free-market competition brings down prices and improves the quality of health care. Critics charge that the private system and free-market competition increase inequalities and spending. Given high out of pocket costs in private systems, low-income populations usually do not receive the same quality of care. In addition, private systems do not always mandate coverage, leaving a large population uninsured altogether.

Scholars have analyzed the social and economic trade-offs with publicly financed healthcare systems by comparing the Canadian health system to the majority privately financed healthcare system in the United States. Peter Cram, Irfan Dhalla and Janice Kwan, medical faculty at the University of Toronto, argue that Canada's publicly funded healthcare system lessens inequalities through the standardized level of care and is highly efficient; however, high taxes, limited specialists, and long wait times plague some often-overwhelmed systems (Cram et. al 2016, 563-564). Cram et. al. contrast the emphasis on community within the publicly funded system as opposed to the priority on competition and autonomy in the United States; this

produces greater equity and smaller disparities in Canada (2016, 564). This difference is illustrated through the authors' comparison of breast cancer outcomes for low-income patients in Canada and the United States; outcomes in Canada were better than in the predominantly private U.S. health system (Cram et. al 2016). This occurred even though the United States spends $1.00 on healthcare for every $0.60 spent on healthcare by Canada (Cram et. al 2016, 563-564). The Canadian system does struggle with fewer physicians and patient beds than the United States as well as less patient-friendly treatment and accommodations, but still boasts better outcomes for low-income individuals.

The United States offers an interesting test case for the advantages of public vs. private healthcare providers since it combines elements of both. Although the United States relies heavily on for-profit private insurance plans, some low-income Americans are covered through government-financed Medicaid. Researchers working together with the state of Oregon have assessed the costs and benefits of expanding public health insurance coverage through a landmark study that compared health outcomes for low-income individuals with and without coverage (James 2015). Known as the Oregon Health Insurance Experiment, researchers evaluated the effect of expanded Medicaid coverage on health care usage, health outcomes, financial hardship, and other outcomes through a side-by-side comparison between the individuals randomly enrolled and those not selected to gain Medicaid coverage. The research found no significant difference on health indicators, even though those who reported to be in good health increased by 24 percent (James 2015). Diabetes and depression proved to be the only conditions which improved under Medicaid coverage. Detection and management improved by 30 percent for diabetes and depression decreased by 30 percent (James 2015). These findings may not have displayed clear health benefits for increasing insurance coverage, but quality of life

clearly improved. The study found that Medicaid has positive effects on financial wellbeing which contributes to the previous argument regarding quality of life. In addition, increasing financial security typically increases overall health and wellbeing. Given that the Medicaid coverage decreased the probability of having unpaid medical bills sent to a collection agency by 23%, health coverage benefits the healthcare system as it does not have to grapple with unpaid bills (James 2015). Even though the United States healthcare system relies heavily on for-profit private insurance, this experiment provides an important foundation supporting publicly funded healthcare access to decrease inequalities.

Analyses of the benefits of different sources of funding for UHC systems: Social Health Insurance vs. tax-financed systems

In addition to differences in public vs. private provision of healthcare, countries also differ in their sources of funding for public health coverage. Health systems that provide universal health coverage have been categorized into four main models. Countries with established Social Health Insurance (SHI) systems cover the majority of the population through compulsory contributions by workers and their employers to private but non-profit health insurance companies that negotiate prices with clinics and hospitals to pay for treatment and services; unlike in the United States, these health insurance companies are non-profit entities that accept all applicants and pay all claims. This system is also known as the Bismarck model (Reid 2010). The government provides coverage to those without employer-provided social insurance. These countries include Austria, Belgium, the Netherlands, Germany, and Japan, among many others (Wagstaff 2009). The next category includes countries with predominantly tax-financed universal coverage systems providing free care by general practitioners, specialists, hospitals,

and public health services; these include Australia, Canada, Finland, and the United Kingdom (Wagstaff 2009). The third group comprises health systems which switched from SHI to universal tax-financed health systems since 1960. Some examples include the health systems of Denmark, Greece, Italy, and Sweden (Wagstaff 2009). Lastly, the final health system includes communist countries which had a SHI system prior to the Communist takeover, then reverted to a SHI system in the 1990s. These countries include Czech Republic, Hungary, Poland, and Slovakia (Wagstaff 2009).

Researchers have compared social health insurance and tax-financed universal healthcare systems to determine which provides the best care. In OECD countries, social health insurance increased per capita spending by 3-4 percent over tax financed systems (Wagstaff 2009). Social health insurance also had an unforeseen effect on employment and the economy. The formal sector share of employment decreased by 8-10 percent, overall harming the economy beyond the increase in per capita spending. This results in an overall reduction in employment as much as 6 percent (Wagstaff 2009). Relative to health outcomes, social health insurance had no significant impact on mortality. In breast cancer among women, social health insurance systems had patients with 5-6 percent more years of life lost (World Bank 2009). This research greatly supports tax-financed universal health insurance over social health insurance given the negative economic impacts while not positively affecting health outcomes, potentially harming some patient demographics. This provides a strong background for this research paper as the costs of social health insurance increase the incentive to expand voluntary health insurance. Supplementary private insurance may help the economy by reducing costs to employers of statutory health insurance contributions and employing more doctors but potentially still may negatively affect health outcomes in terms of unequal access.

Evaluation of the Impact of Voluntary Health Insurance

Universal healthcare systems vary in the extent of coverage provided by compulsory public insurance. Universal health coverage, whether financed through general taxes or mandated employer and employee contributions, guarantees affordable access to essential treatment and prevention as well as essential medicines and vaccines for all. Beyond these essential services, individuals must cover the remaining costs for health services. One way which individuals expand their coverage or reduce co-payments is through voluntary health insurance. Voluntary health insurance (VHI) plans are available to complement or supplement the coverage provided by government-mandated healthcare systems. In this parallel private sector, private actors purchase VHI from commercial or non-profit health insurance companies. This VHI can then be applied toward alternate services or private medical practices.

Experts argue that the growing role of the private sector and increasing privatization of welfare services have increased health inequalities. Some research has found private provisions of healthcare to be more efficient but also recognized that patients with private health insurance tend to be younger, healthier, and wealthier. The better health outcomes may reflect these demographic factors rather than the superiority of private health insurance. In a recent study of the consequences of a shift to partial privatization of healthcare, Filc et. al. (2020) finds that "mixed provision of private and public services does not necessarily lead to better performance, while harming equitable access and provision of health service". On the contrary, some argue that public health systems are easily overwhelmed, putting patients at greater risk given the lack of opportunity to see a physician in a timely manner. While publicly funded healthcare is often overused, private healthcare plans that provide voluntary health insurance rely on

underutilization to convince users to pay more for additional or quicker treatment. Given the cost of private insurance (VHI), those of lower socioeconomic status typically do not seek healthcare that is not covered by public or employer-subsidized insurance unless absolutely necessary. Experts continue to debate the best system for healthcare as public and private insurance each boast varying strengths and weaknesses.

OECD policy analysts Francesca Colombo and Nicole Tapay assess the effects of private health insurance, which they define as coverage for a defined set of health services financed through private non-income-related payments made to an insuring entity (2004, 7). Private health insurance markets generally coexist with public health coverage systems, offering a substitute to public coverage, a complement to "top up" reimbursements by the social security system, or supplementary coverage of additional services or preferred access (Colombo and Tapay 2004, 14-15). Colombo and Tapay point to arguments that competition among for-profit insurers will lead to better customer service, more choice and greater efficiency; proponents also suggest that increased reliance on private health insurance would enable governments to cut public health sector costs. On the other hand, critics argue that private health insurance may prove to be administratively costly and may exacerbate health inequalities by enrolling healthier individuals and burdening public plans with more difficult and costly cases (Colombo and Tapay 2004, 7-8).

In analyzing countries within the OECD, those with the highest shares of private health insurance had lower shares of out-of-pocket spending relative to total health spending (Colombo and Tapay 2004, 8). However, this finding was skewed by a few outliers, such as the United States, with extremely high private health insurance expenditures. To control for economic differences and the impact on health outcomes, these researchers analyzed the relationship between the market for VHI and out-of-pocket spending relative to the total health expenditure.

In comparing this data, the market size was considered and not found to have a significant effect on health expenditure. At the OECD level, countries with expanding economies, such as Eastern European countries or Luxembourg, have not seen an expansion of population covered by private health insurance (Colombo and Tapay 2004, 10). This shows that economic expansion does not correlate with an expansion of the private health sector.

Those covered by VHI tend to be younger and healthier, skewing the pool of those covered by public insurance to those with greater health risk (Colombo and Tapay 2004, 14). In virtually all European countries, VHI mainly covers people who are richer and better educated and who live in wealthier, urban areas (Sagan and Thomson 2016, Figure 2.13). Johan Mackenbach, a public health expert in the Netherlands, provides varying indicators of health inequalities throughout Europe, concluding that lower socioeconomic position is associated with higher rates of mortality and morbidity: "People with a lower level of education, a lower occupational class, or a lower level of income tend to die at a younger age, and to have, within their shorter lives, a higher prevalence of all kinds of health problems" (Mackenbach 2006, 41). This results in private insurance companies profiting off their better risk profile clientele. Mathauer and Kutzin find that VHI is not an effective means of covering the gaps in publicly financed health coverage and its benefits are concentrated among middle- and higher-income groups; lower-income people with higher health risks may not be able to afford to purchase additional coverage, especially if private insurers seek to weed out people with higher health risks and thus higher expected health care costs (2018, 5-6).

Proponents of VHI argue that it provides consumers with added flexibility in providing coverage for ancillary or supplementary services which public systems may not cover, along with the ability to choose to purchase the private health insurance or even opt out of the public

insurance depending on the system (Colombo and Tapay 2004, 15). Overall, Colombo and Tapay conclude that private health insurance tends to increase responsiveness and enhance consumer choice, but it also raises concerns about health inequalities, especially given difficult access for low-income and high-risk groups (Colombo and Tapay 2004, 51).

Research on sex-based inequalities in health outcomes in UHC systems

Variation in health outcomes can also be attributed to additional social factors, such as gender. Since the 1970s, experts predict the life expectancy at birth for women to be approximately eight years longer than men (Mackenbach 2006). This can cause women to be overlooked in inequality research, specifically regarding health care throughout Europe. In comparing variation in health outcomes by health care systems, gender can be analyzed as an alternative explanation for variation. Looking at gender differences in self-assessed health outcomes, a paradox exists that women in developed countries have better health outcomes than men but nonetheless report more health problems than men do. This cross-national study found a significant relationship in thirteen countries between gender and self-assessment of poor health (Bambra et al. 2008). Specifically, Denmark, Sweden, Norway, Holland, Italy, Spain, and Portugal were found to have the highest difference between men and women. This source also found the greatest difference between highly educated groups in Italy, Sweden, and Portugal (Bambra et al. 2008). This challenged previous research from Schulman et al. which tied low education and socioeconomic status to worse health outcomes because this data suggests a purely gendered difference in negative outcomes (Bambra et al. 2008). The research by Bambra produced a surprising finding that strong gender differences in self-assessed health occurred in both South European countries that have relatively low levels of gender equality as well as

Nordic countries that have high levels of gender equality. This raises questions regarding whether differences in women's health outcomes are influenced by the extent to which health coverage is covered by statutory vs. voluntary insurance.

Breaking down research by gender and sex can reveal important disparities. Strikingly, medical research often does not include women, let alone aggregate by sex (Criado-Perez 2019). Concerns have arisen regarding the lack of inclusion of women in drug research given the biological differences between men and women. This results in a negative effect on women's health as treatments may not be as effective as well as potentially harmful. Even though this research looked at sex disparities in drug research, the finding that data on women's health is underexamined can be applied to broader health research. Within health data, some findings prove to be insignificant when broken down by sex, but significant when examining the data within a sex (Criado-Perez 2019). Within the European Union, both sexes must be studied in pre-clinical research, providing greater equality within clinical trials. However, regarding the application of medicine, medical schools greatly lack information on sex-specific differences in women as well as fail to offer adequate classes on women's health (Criado-Perez 2019). These disparities may affect health inequalities between the sexes as doctors' training will influence the quality of care received by each sex. Healthcare systems may perpetuate or remedy underlying biases, displaying the importance of aggregating health research by sex.

A profile of health inequalities in Europe found regional differences in inequalities in mortality of ischemic heart disease and stroke. Among women, the northern countries had greatest inequalities in mortality of ischemic heart disease while the southern countries had greatest inequalities in mortality for strokes (Machenback 2006). This regional difference may be important regarding the healthcare system as the northern Nordic countries have very low private

health insurance participation compared to Southern European countries. No Eastern European countries were included, signifying that there may not have been as strong of a relationship in Eastern Europe, or these countries were not explored due to less available data. This source would be stronger if it included inequalities throughout Eastern Europe as these nations more recently transitioned from Soviet-style health care systems that provided free health care for all as a government-financed and -organized service but with notably low quality. This data raises questions regarding the causes of these differences as stroke and heart disease occur equally between men and women; however, the difference shows that some regions may be better at treating one condition in women better than the other condition. This source also identified similar levels of inequalities in breast cancer mortality rates across all of Europe.

Conclusion

Comparative studies have shown the benefits of publicly funded universal healthcare symptoms while acknowledging the benefits of competition among private, for-profit health care providers. As a result, experts disagree about the best type of system as tradeoffs exist between patient-centeredness and equity. Similarly, increased reliance on voluntary (private) health insurance can increase the quality and timeliness of care for those who can afford extra premiums, but this can result in poorer coverage for the wider population, including poorer people. Private health insurance makes healthcare providers more accountable for the care being provided as patients have the option of leaving for private sector care. On the other hand, this may also result in a lack of trust in publicly funded healthcare systems.

Further research on the effects of different healthcare systems is needed to maximize the best outcomes. More specifically, variations among universal healthcare systems in Europe allow for an investigation of the effect these have on underlying inequalities, including health outcomes for European women. This paper will address the gap in research regarding the impact of private insurance on health inequalities. A potential relationship will be explored through gathering data on the regional differences in the inequalities of health and comparing these to the participation rate of voluntary private insurance in European countries to determine whether greater reliance on voluntary private insurance worsens inequality and health outcomes.

Comparative Case Studies

Qualitative case studies provided insight into universal healthcare systems in the OECD and Europe. These case studies display countries from four categories of UHS systems. The Netherlands offers an example of a social health insurance system while Sweden functions under a tax-financed system. Both Latvia and Poland have transitioned to new healthcare systems following the collapse of communism. Latvia adopted a tax-financed system and Poland adopted a social health insurance system. Poland and Latvia have considerably lower GDP per capita than the Netherlands and Sweden. Unsurprisingly, total health expenditure in the former two countries account for a lower share of GDP than in the Netherlands and Sweden. Out-of-pocket expenses are notably higher in Latvia and Poland than in Sweden or the Netherlands. Voluntary health insurance parallels out-of-pocket costs in that both pose extra costs to consumers and fall under private expenditure. On the other hand, voluntary health insurance doesn't have a clear association with the countries' economic status, as the Netherlands has a higher VHI participation rate than Latvia.

Table 1 displays an overarching comparison of health, social, and economic indicators by country in comparison to the OECD. Life expectancy, as indicated in Table 1, is not only significantly lower in Latvia and Poland but both countries also show a marked difference in the life expectancy of men and women. These notable differences in health outcomes between men and women were analyzed regarding voluntary health insurance participation. Given that prior associations have been made between VHI and socioeconomic inequalities in health outcomes, these cases aim to analyze if these effects extend to sex-based inequalities. In depth case studies allow for smaller sex-based inequalities to be identified, such as differences in life expectancy relative to the OECD average. Sex and gender-based inequalities in health often can be

overlooked when analyzing gender health data. Through breaking down outcomes by sex and looking into societal factors, such as unpaid labor statistics, and other policies, disparities in health outcomes can be identified in both men and women. These four case studies provide examples of how health systems and voluntary health insurance impact health outcomes in men and women, relative to national policies and informal social barriers.

Table 1. Comparison of health, social, and economic indicators by country.[1]

Countries	GDP per capita	Total health expenditure as share of GDP (2021)	Supplementary VHI Participation	Out-of-Pocket Expenses	Life expectancy women/men (Years, 2021)	Gender Inequality Index
Poland	**$15,742**	**6.6%**	**0%**	**20%**	**75.6** **71.7 / 79.7**	**0.115**
Latvia	**$17,736**	**7.4% (2020)**	**20.3%**	**36%**	**73.4** **78.2 / 68.6**	**0.176**
Sweden	**$52,274**	**11.4%**	**10%**	**14%**	**83.2** **85 / 81.4**	**0.039**
Netherlands	**$52,396**	**11.2%**	**83.2%**	**10.6%**	**81.5** **83.1 / 79.9**	**0.043**
OECD average	**$38,116**	**9.6%**	**24.5%**	**21.3%**	**81.0** **83.6 / 78.3**	**0.108**

[1] Data was obtained from the OECD (2021), World Bank (2019, 2020d), and United Nations Development Programme (2020).

From Communism to a Social Health Insurance System: The Case of Poland

Under communist rule, the health status of the Polish people was markedly worse than in countries within the European Union. Following the transition to democratic rule and transformation of Poland's economic system, health outcomes improved; average life expectancy increased from 70.6 years in 1991 to 76.8 years in 2012 and infant mortality dropped from 14.7 per 1000 live births in 1991 to 4.5 in 2012 (Sun 2019: 542). Nonetheless, Poland still lags behind other European countries in terms of health outcomes, as discussed below. Economic inequality limits some Poles' ability to access timely and affordable care, and gender inequality negatively impacts both men and women.

The Polish health system underwent reform away from state ownership to a partially privatized system in 1989. In 1997, a decentralized system with seventeen independent insurance funds moved the system further toward decentralization. These were merged in 2003 to form a single National Health Fund (NHF), with management and financing functions were shared among the NHF, Ministry of Health and territorial self-governments (Topór-Mądry et al 2008; Sun 2019: 543). Poland finances the NHF through an 8.5% deduction from the individual income of each Polish citizen (Tashin 2020). Given the volatility of the Polish healthcare system, Poland continues to be cited for organizational problems as the NHF funding must be converted into federal budget funding which contributes to the understaffing of physicians, particularly specialists (Tashin 2020).

The Ministry of Health formulates a National Health Program (NHP) every ten years that articulates goals for improving public health as well as indicators to be monitored. Despite laying out strategic goals, National Health Programs have not assigned responsibility for public health measures to specific institutions and budgeting was only included for the National Program for

Prevention and Treatment of Cardiovascular Diseases, the National Program for Cancer Control and the 2006 Law on the National Emergency Medical Services (Topór-Mądry et al 2008). This discrepancy in funding and action likely positively impacted cardiovascular, cancer, and emergency medical services but left all other aspects of healthcare vulnerable due to inaction and underfunding.

In an economic review of the Polish healthcare system by the OECD, reviewers found efficiency concerns in hospitals, preventative care, and health worker remuneration. Improving these aspects of the Polish health system would reduce waiting times, lower costs, and inevitably improve patient satisfaction (Girouard and Imai 2000). Within hospitals, Poland typically places doctors into managerial positions even though they are not trained for these positions. In addition, hospitals lack infrastructure and investment, causing their technological capacities to be lower than those of other OECD countries. Contributing to the hospital concerns, underutilization of preventative care results in a greater demand for emergency services. Polish medical training does not include formal primary care training as infrastructure for specific primary care offices do not exist, rather polyclinics provide primary care among other services (Girouard and Imai 2000). A lack of access to preventative care creates an overreliance on hospitals as well as harms the Polish general health as conditions are not caught early and health concerns cannot be addressed preemptively to mitigate risk. Lastly, these inefficiencies are exacerbated by the poor pay which medical professions receive in the Polish public sector. This results in healthcare workers increasing their presence in the private sector to supplement their income. Medical professionals typically increase their earnings by approximately 15% through private consultations and unofficial out-of-pocket payments increasing supply and demand within the voluntary health insurance market (Girouard and Imai 2000). VHI could be used to

pay for private consultations, but not unofficial out-of-pocket payments, suggesting that both make accessing health care more expensive and less equitable. These compounding factors fuel the Polish health system inefficiencies which directly impact health outcomes and fuel inequalities.

Poland's public health sector covers 72% of health spending; yet the out-of-pocket costs remain high at over 20% of current health spending even with a compulsory health insurance coverage rate of 91% (OECD 2021c). These high costs stem from the fragmented health system which relies on uncoordinated infrastructure. Social health insurance provides the basis for Poland's health system which is centrally regulated by the Ministry of Health but shares the responsibility with "three levels of territorial government: municipalities oversee primary care; counties are responsible for (often) smaller county hospitals; and voivodeships (regions) are responsible for generally larger regional hospitals. The Ministry of Health supervises the highly specialised tertiary care providers." (OECD 2021c) This creates a clear divide between the majority public hospitals and minority private outpatient care facilities.

Public funding for health expenditure in Poland lies at 71.8% as of 2019 which remains below the EU average of 79.8%. Additionally, 20.1% of the non-public health care spending came from out-of-pocket expenditures, primarily spent on outpatient care (OECD 2021c). Voluntary health insurance (VHI) exists in Poland, around 8% of total health expenditure. Typically, VHI participation comes "in the form of group insurance packages covering occupational health and other health services purchased by employers for their employees." (OECD 2021c) However, a noticeable interest in VHI has been noted, likely as a result of the global pandemic increasing difficulties in accessing public health resources.

Poland's out-of-pocket costs directly inhibit healthcare due to income inequality. The GDP per capita in Poland is $15,742.5, which is $18,431 less than the European Union average (World Bank 2020b). High out-of-pocket costs further exacerbate income inequality issues. The top 10% of Poles make €67,591more than the bottom 50% of Poles (WID 2015b). This further exacerbates existing inequalities as the top 10% can easily afford healthcare costs, including private options, while the bottom 50% do not have the means to pay large out-of-pocket fees. In addition, 15% of the population lives below the poverty line (UN Women). This inequality contributes to the disparity seen between private and public providing, as the public system struggles greatly with physician understaffing which fuels the demand for the private market (Tashin 2020).

Vast gender inequalities exist in Poland, potentially influencing women's overall health. Some include that 100% of men in Poland receive a pension upon retirement, while only 71.6% of women do (UN Women). This creates an income gap at the retirement level, years beyond the traditional wage gaps which affect female workers. Additionally, male, and female unemployment rates are comparable (3% vs. 3.6%), but women in Poland spend much more time on unpaid domestic chores and care work (17.6% vs 9.6%). The inequality in unpaid labor burdens women's lives in a variety of ways. This particularly influences health outcomes as women may not have the time to go to the doctor or spend more time doing unpaid labor so they cannot pursue as much paid labor. This can result in worse health outcomes for women due to economic barriers, as well as time limitations and overburden.

Not only do women face barriers in receiving pensions all together, but women in Poland also receive lower pensions than men due to the fact that they generally work fewer years than men. Women are allowed to retire at 60 and are more likely to take career breaks for childcare.

In addition, women are more likely to work in the informal sector or part-time and female dominated jobs tend to have lower pay. Polish women spend 8% more time on unpaid work than men (UN Women). This reduces the level of pension women receive and hits widows especially hard (Chłoń-Domińczak et. al. 2012: 62). This creates a wide, ongoing accessibility gap throughout a woman's life. This also places a greater burden as women may feel more stress due to financial limitations, compiled with a greater workload than men.

Gender inequality may contribute to poorer health outcomes for men as well, as traditionally masculine gender norms can have a negative impact on men's health. Pressures to demonstrate toughness may combine with the perception that seeking help, especially mental health treatment, is unmanly (Courtenay 2000). These gender norms may help explain the disproportionately high suicide mortality rate for men in Poland: 20.1 deaths per 100,000 population vs. 3.1 deaths per 100,000 population for women (UN Women). Gender norms, together with the Polish health care system's lack of emphasis on preventative care, may contribute to higher male mortality rate from cardiovascular disease, cancer, diabetes, and chronic respiratory disease; Polish men have a very high rate of tobacco use (30.3% vs. 21.6% for women) and a 22.8% probability of dying from one of these causes, compared to 11.5% of women (UN Women).

Difficulties within accessibility of the healthcare system and societal norms translate into inadequate coverage for cancer screening and treatment; although cancer incidence rates for men and women both remain lower than the EU average, the mortality rate remains 30% higher for men and 25% higher for women, indicating a flaw in the system in terms of providing screenings, diagnosis, and treatments (OECD 2021c). This comes at a time when 4.2% of the Polish population reported unmet medical needs, relative to the 1.7% EU average. Cost, distance,

or waiting times predominated as sources of hindrance (OECD 2021c). These issues indicate a potential overcrowding issue between the public and private systems, as patients seek private providers to avoid long waiting times, encouraging physicians to work in both sectors. Marginalized groups then face further inequalities as private care comes at an added cost. Location plays a similar role as patients may be limited by the availability of providers in their area, either forcing them to wait for public care or to rely on their own finances to dictate if private care can be afforded.

Currently, low participation rates in cancer screening programs contribute to the poorer prognosis for cancer patients. Only 54% of the targeted population participates in screenings for breast cancer while cervical cancer screenings dwindle down to 17% (OECD 2021c). Similar trends are seen in five-year cancer rates as Poland's breast cancer rate remains 5% and the rate of cervical cancer remains 8% lower than EU averages. Prostate cancer five-year survival rate falls 9% below the EU average, showing similar levels of decreased care for men to those of women. Women in Poland experience high rates of gender-specific cancers: breast (25%), uterine (10%), ovarian (5%), cervical (4%) (OECD 2021c). This shows a gender specific trend in cancer rates specifically in relationship to a healthcare system with a relatively larger private sector, moderate VHI participation rate, and high out of pocket costs.

Poland provides an example of a mix of a publicly provided social health insurance with a larger private practice sector. Inefficiencies due to the lack of developed primary care fuels many issues, such as wait time concerns and accessibility challenges. Additionally, income inequality and gender inequality influence health outcomes due to the large out of pocket costs which Pole's must pay for medical care. With the infrastructure challenges, Poland has a market for voluntary health insurance which grants access to the private health sector, further

exacerbating inequalities. Since the transition from the communist regime, Poland has improved healthcare, but Poland still lags other European Union and OECD countries. Opportunities exist to improve outcomes further through enacting policy to ensure gender equality within the pension system, expanding public coverage, and improving accessibility to medical facilities, especially primary care physicians.

From Communism to a Tax-Financed Health System: The Case of Latvia

Like Poland, Latvia inherited a weak health care system when it gained independence in 1991. Under communism, health care was formally free, but resources were scarce, and physicians had very little training. Many people received health subsidies from their workplace, leaving children and non-working mothers vulnerable to greater unmet medical needs (Rechel and McKee 2009). Like other communist countries, Latvia switched away from a communist universal health system managed by the government to a purchaser-provider mixed Latvian National Health Service, with a growing reliance on out-of-pocket payments, and a greater emphasis on strengthening primary care (Rechel and McKee 2009). This reflected a rejection of policies associated with Soviet rule as well as economic upheaval created by the transition to a market economy.

Healthcare in Latvia remains distinguished by the low level of public funding and the presence of a considerable gender gap within all of society. Currently, public funding covers 61% of health expenditure leading to Latvia's ranking as second highest in the EU for out-of-pocket health spending. In parallel, Latvia ranks fourth lowest in the EU for health expenditure. The Latvian health benefit package remains narrow and limited by a quota system leading to 15% of households experiencing "catastrophic" spending on health (OECD 2021a). The quota system sets a limit on the financial amount of healthcare coverage which each person gets and once the quota is reached, Latvians either must pay the costs privately or wait until the next year when the quota resets. The Latvian National Health Service supplies universal population coverage and general tax financed health care provisions while the Ministry of Health defines the policies and regulations.

The Latvian National Health System provides universal coverage through a system funded by general taxes, as well as some social security tax contributions (Behmane et al 2019). The system employs a purchaser-provider split with a mix of public and private provisors to increase competition within the health system. The parliament oversees the NHS budget while the Ministry of Health overseas the organization, functioning, and policies of the health system (Behmane et al 2019). Ownership of health entities varies throughout Latvia. Municipalities own some small and regional hospitals. Larger hospitals typically are owned by the state (Behmane et al 2019). Primary care physicians tend to be privately owned but contracted by the NHS while hospital providers fall under public ownership (Behmane et al 2019). Flaws arise within this system due to the frequent political and institutional changes which negatively impact policy implementation. Most notably, a lack has been noted between investment planning and health needs leaving areas of need vulnerable (Behmane et al 2019).

The Latvian health system has pursued reforms in recent years. After the global financial crisis in 2007-2008, a process of institutional centralization was pursued as well as a shift away from hospital care to outpatient care (Behmane et al 2019). In the following four years, the number of hospitals were dramatically reduced as broad changes to health care administration further changed the dynamics of the system (Behmane et al 2019). Since 2013, the financial stability of the Latvian Health System has been the focus of reforms. A law was passed by parliament for a Compulsory Health Insurance System to increase revenues to be enacted in 2021 but the reform was abandoned. The new system would have enacted a Social Health Insurance (SHI) system with a full benefit package (Behmane et al 2019). The Compulsory Health Insurance System may have provided more comprehensive coverage leading to a healthier population due to greater health funding and more widespread access. Politicians argued for the

SHI system as health services would be linked to the payment of income taxes which would increase the health revenue (Mitenbergs 2014).

With the lack of change in health system structure, the Latvian NHS has worked to strengthen primary care to increase affordability, effectiveness, and greater comprehensiveness in health care provided (Behmane et al 2019). Through emphasizing primary care, resources can be better allocated with reduced demand for medical services and hospital beds. Financial incentives and priority matching for medical students has been employed to increase retention of health works (Behmane et al 2019). Particularly, priority matching has been emphasized for students who apply for residency in a rural area to increase access to physicians in the most needed areas. In studies regarding barriers to maternal care, the Latvian system had accessibility and inequalities in provider knowledge as major barriers to adequate care (Miteniece 2018). These reforms come as Latvia remains in the top five within the OECD in unmet needs for medical examination due to cost, waiting time, or travel distance (Behmane et al 2019). These proposed reforms should, at least marginally, improve the unmet need due to accessibility concerns. Major reform likely will be needed to address cost disparities as high out-of-pocket costs leave low-income populations more vulnerable as they cannot receive needed healthcare.

Even with basic healthcare coverage for the entire population, 36% of health expenditure comes out of pocket as patients must pay user fees for all services and goods, particularly pharmaceuticals (OECD 2021a). Latvian basic coverage also does not cover dental, rehabilitative, or physiotherapeutic care, among other things. Accessibility further perpetuates flaws in the healthcare system. Geographic access to health professionals remains highly uneven, leaving rural populations without adequate access to healthcare. Furthermore, the shortages of funding limit the public provider options, resulting in patients choosing to make direct private

payments for care to avoid long wait lists and times. Additionally, pharmaceuticals drive out-of-pocket spending as many medications are not reimbursed by public insurance and no ceilings exist for out-of-pocket payments for outpatient pharmaceuticals (Behmane et al 2019).

Even with these gaps in funding, VHI remains low and only accounts for 3.6% of health expenditure (OECD 2021a). Research has attributed the lack of a market for VHI to lower income levels which make private voluntary insurance too expensive (Brigis 2016). With a GDP per capita of $17,736, out-of-pocket costs burden an already financially challenged population (World Bank 2020a). Income inequality also extenuates the gap as the top 10% of Latvians make €52,327 more than the bottom 50% of Latvians (WID 2015a). This gap reflects the small percentage of VHI participation as the high-income majority can afford VHI, but not the average Latvians. The Latvian healthcare system lacks comprehensive coverage, creating gaps which VHI has not expanded to cover. These flaws fuel 10.5% of Latvians reporting an unmet need for medical care due to financial reasons. Additionally, nearly one quarter of low-income Latvians forgo needed medical examinations due to cost (OECD 2017). These disparities fuel negative health outcomes and greater unnecessary mortality.

Given the funding flaws, Latvia unsurprisingly falls below other European countries in terms of health indicators. Specifically, Latvia's cancer screening rates remain 20% lower for breast, 18% for cervical, and 9% for colorectal relative to the EU average (OECD 2021a). Combined with the lack of screening, in Latvia approximately 200 more men per 100,000 are diagnosed with cancer than the EU average. However, the cancer rate for women is approximately the same as the EU average (OECD 2021a). This gender gap exists in life expectancy as women averaged to live nearly 10 years longer than men. Smoking and alcohol

consumption were cited among other factors as the key health factors causing this gap (OECD 2021a).

Similarly, to Poland, women in Latvia receive lower pensions than men because they generally work fewer years than men. Women are allowed to retire at 57 and are more likely to take career breaks for childcare, as they spend 9.2% more time on unpaid work than men (UN Women). The loss in level of pension for women who take career breaks is even higher in Latvia than in Poland. (Chłoń-Domińczak et. al. 2012: 63). Men in Latvia have a higher long-term unemployment rate, due in part to the effect of closing Soviet industries in the country, which increased unemployment for older working-age men. Women nonetheless earn considerably less than men, with a gender earnings gap that is considerably higher than the OECD average. They also perceive their health to be much worse than men do, with a perception gap that is also much higher than the OECD average. Additionally, women are much less likely than men to feel safe ("How's Life?" 2020). These social factors and wage gaps weigh on women, affecting their well-being and contributing to poorer general health.

However, even with the large gender gap and regionally average cancer rate for women, the five-year cancer survival rates show stark gendered differences. While the prostate cancer survival rate remains at 90%, 3% above the EU average, the breast and cervical cancer rates are 5% and 9% lower than the EU average respectively (OECD 2021a). Even with similar occurrence rates, breast cancer outcomes remain worse than average while prostate cancer outcomes remain above average. This raises an interesting gender disparity between Latvians which may be potentially linked to existing gender inequalities in income and education. Women earn 18% less than men in Latvia and educational disparities exist as women in Latvia unevenly study education, health, and humanities (European Institute for Gender Equality 2020). The

largely female dominated healthcare field may affect health outcomes in addition to the health care system structure, as female caretakers may be more perceptive to female specific health concerns.

From a policy standpoint, the health system remains as a low priority for the Latvian government. Spending within the Latvian health system ranks only at a third of the average for an OECD country with 5.5% of GDP going toward public health expenditures (OECD 2017). Even in comparison to countries with similar economic development, Estonia and Latvia spend approximately one percentage point of GDP more than Latvia does. This lack of health financing contributes to higher mortality rates which the life expectancy reflects with Latvia ranking last in life expectancy out of OECD countries (OECD 2017). These health outcomes could likely be improved through greater public expenditure on health, specifically by targeting disadvantaged groups.

Likely fueled by the lack of funding, both primary care and acute care vary greatly. Within primary care, high rates of hospital admissions raise concerns regarding the access and quality of primary care (OECD 2017). If conditions such as asthma are not receiving proper preventive care, then they result in greater hospital visits, but regular preventative treatments keep long term conditions manageable. In addition, the rate of admission for diabetes has been more than double the OECD average. Fueling these concerns regarding the quality of health care, Latvia ranks second highest in the OECD for hospital mortality (OECD 2017). Shortcomings have been noted in areas including the timely transport of patients and effective medical treatments. Some medical treatments may not be the most effective if given. These health disparities in both preventative care and acute care may be reflective of vast differences in access

to care. Due to health professional shortages, rural areas have particularly limited access to health care (OECD 2017).

The Latvian health system displays the effects of unmet medical needs due to a variety of factors, including cost, waiting time, and travel distance. Health outcomes and life expectancy reflects these accessibility issues, as Latvia ranks below other equivalent countries in Europe and the OECD. High out of pocket costs, coupled with a lack of VHI due to cost, further exacerbate accessibility to health services and contributes to worse health outcomes. Similarly, to Poland, Latvia also has gender-based gaps in pension income due to women pursuing more unpaid labor, and less paid labor than men. This financial barrier leads to worse health outcomes, particularly in a country with accessibility barriers for healthcare. The Latvian government has drafted legislation to improve public coverage, but political and economic instability further fuels infrastructure-based problems within the Latvian National Health Service.

National Health Service System: Sweden

Experts recognize Sweden as having one of the most comprehensive welfare systems in the world, with generous health insurance, pension benefits and protection against work injury and unemployment. This system dates to 1946, when the government passed through reforms to nationalize health care providers, using publicly employed doctors and public hospitals (Immergut 1992). This system has been identified as the most socialized health system in Europe. Interestingly, the implementation of the national health insurance in 1946 was unpopular but doctors, employers, and white-collar workers did not have sufficient political influence in parliament to block the legislation (Immergut 1992). The Social Democratic party enacted policies that reduced the market power of doctors and decreased the private health sector (Immergut 1992). The strength of the Social Democratic party prevented doctors from even going on strike, as the-legislature had the power to punish doctors by increasing their fees in response to any opposition. This power allowed the Swedish government to enact the most comprehensive health system in Europe

The Swedish health system provides automatic, universal coverage to all legal residents, guaranteeing all Swedish residents necessary healthcare services at very low cost. Undocumented children receive full rights to care while the undocumented adults only can receive actively needed care. In addition, all patients from the European Union are covered for emergency medical care (Commonwealth Fund 2020). Medical treatments provided at hospitals are free of charge and patients pay only a small amount of outpatient and drug fees. Sickness benefits cover 80% of worker' salaries during sick leave and a daily cost-of-living subsidy for those who are unemployed. Sweden's strong commitment to gender equality is reflected in its maternity and paternity leave policies; pregnant women receive 11 months of maternity benefits

at 80% of their salary while new fathers receive 10 days of paternity leave at 80% of their alary (Sun 2019: 413).

The Swedish health system uses a primary care focused structure to improve efficiency and ensure widespread access to care. All primary care providers in a region must provide after hour care (Commonwealth Fund 2020). Typically, primary care doctors in an area will use a rotating schedule to balance providing the after-hour care with personal life. Additionally, urgent cares are open from 8am to 10pm to ensure comprehensive hours reduce the need for hospital care (Commonwealth Fund 2020). The regions own the public community hospitals and within Sweden, seven public university hospitals exist which can provide more advanced care due to greater access to technology given the opportunities for development and research (Commonwealth Fund 2020). These expanded opportunities allow patients to seek the level of care needed, reducing wasted health resources and spending.

Sweden's comprehensive healthcare system is largely financed through regional and municipal taxes, with subsidies and grants from the federal government used to redistribute resources among municipalities and regions based on need and to fund specific initiatives, such as reducing wait times (Commonwealth Fund 2020). Income and payroll taxes fund the Swedish social insurance agency, which reimburses medical expenses and subsidizes the cost of prescription and non-prescription drugs as well as dental care (Sun 2019: 408-410). The central government subsidizes healthcare expenses that are not covered by social insurance. In DATE, 85% of spending on healthcare was publicly financed leaving 15% of health expenditures paid for privately. The vast majority of these private expenditures were out of pocket costs since supplemental VHI for add-on coverage is quite limited. Private health insurance "is purchased mainly by employers and is used primarily to guarantee quick access to an ambulatory care

specialist and to avoid wait lists for elective treatment. In 2017, 633,000 individuals had private insurance, representing roughly 13 percent of all employed individuals ages 16 to 64 years" (Commonwealth Fund 2020).

The national government covers regulation and supervision while the financing, purchasing, and providing of the health services fall under the jurisdiction of county councils and regional bodies. Primary, specialist, and psychiatric health fall under the county's responsibility while municipalities cover disability, rehabilitative, home, social, elderly, and school care (OECD 2021d). Even with the extensive public provider sector, Sweden still finances a small private sector through public funding and allows the Swedish people to choose primary care providers and specialists at their own discretion. This offers a different kind of mix of public and private providor systems in an attempt to combine the benefits of each. While the number of private healthcare institutions has increased, county councils pay part of the cost of care provided in order to ensure that patients have access to the same treatments at both public and private healthcare institutions (Sun 2019: 410)

The national government sets the overall healthcare policies, creates the regional budgets, and coordinates intergovernmental work. The regional level finances and delivers health care to their residents. This includes determining the salary of regional doctors, allowing regions with a greater physician shortage to offer financial incentive for the location of practice. Regions set the copayment rate leading to come variation in healthcare cost throughout the country. Lastly, the local level handles care for the elderly and disabled (Commonwealth Fund 2020). A private sector health sector still exists, only accounting for one percent of the health sector. Voluntary private insurance provides quick access to outpatient specialist and elective services. Employers purchase most voluntary health insurance policies at 82% with only 6% of purchases being for

individuals themselves (Anell et al 2012). Contrary to other universal health care systems, the Swedish health system lacks a centralized data system (OECD 2016). This prevents doctors from receiving necessary information regarding a patient's health history and negatively affects the care capacity of Swedish doctors.

This decentralized system provides a strong foundation for preventative measures. Specifically, regarding cancer screening, breast examination participation for 50–69-year old's is 95%, the highest rate in the EU. These screenings are offered for all women aged 40-74. Sweden's expansive women's health resources include cervical cancer screening, including cytology, for women 23-64 and human papillomavirus testing for women over 30 (OECD 2021d). These preventative measures aim to tackle the female cancer rate which remains slightly higher than the EU average while the male rate remains slightly below.

Sweden ranks very highly worldwide for gender equality. Sweden has "91.7% of legal frameworks that promote, enforce and monitor gender equality under the SDG indicator in place" (UN Women). This means that gender equality has been extensively integrated into Swedish society. In Sweden, generous child-care pension rights help neutralize the effect of lost contributions toward retirement benefits due to career breaks, opposed to the gender gaps seen in Poland and Latvia (Chłoń-Domińczak et. al. 63). This results in greater gender equality throughout a woman's entire life as less women face pay gaps while raising children, then receive equitable pensions when retiring. The child-care pension and 480 days of paid leave are shared between both parents, providing women more support (UNFPA 2022). This allows women to return to work sooner and achieve a more equitable balance regarding unpaid work. Women still spend 3.4% more time than men on unpaid work, creating a small gap (UN Women). These policies support gender equality which translates to health outcomes as women

have the time and opportunities to seek preventative care and with comprehensive coverage, women do not face ongoing financial barriers.

Sweden ranks highly among high income countries regarding health care equity (Commonwealth Fund 2020). Swedish health policy emphasizes equal access to services by need to ensure a very low level of unmet need. Specifically, Swedish policies emphasize equal access to care regarding gender, income, and education (Commonwealth Fund 2020). Specific programs have been made to target vulnerable populations. To address discrimination by health, the region allocates funds towards areas with greater calculated illness and socioeconomic related conditions (Commonwealth Fund 2020). The 0-7-90-90 wait time guarantee ensures equal access to health services. The 0-7-90-90 ensures instant contact with a health provider for advice, a seven-day turnaround for seeing a general practitioner, a 90-day maximum wait to see a specialist, and a 90-day cap post diagnosis to ensure treatment (Commonwealth Fund 2020).

The vast healthcare coverage and infrastructure better support the Swedish people as displayed by the narrow gender gap. The life expectancy between Swedish women and men is only 3.5 years, below the 5.6-year EU average (OECD 2021d). Other observable inequalities have been reduced such as differences in life expectancy between varying educational levels. The gap between the least and most educated differed by 4 years for men and 3 years for women (OECD 2021d). Cancer survival rates also support equality between the genders. Breast cancer survival hovers at an astounding 89%, above the EU average of 82% while cervical cancer survival sits 5% higher than the EU average and prostate cancer survival is 4% higher (OECD 2021d). Throughout Sweden, multiple indicators supported the reduction of health inequalities across a multitude of demographics.

An interesting discrepancy exists between female and male smoking habits in Sweden. Smoking became popular in Sweden earlier than other European countries (Anell et al 2012). This led to an increase in lung cancer rates among women since 1980. During the same period, the smoking habits and lung cancer rates in men decreased. Beyond lung cancer, deaths due to chronic obstructive pulmonary disease increased 84% between 1987 and 2009 among women (Anell et al 2012). This can be reflected when comparing the life expectancies between men and women as the male mortality rate in Sweden remains low up to age 75, while mortality in women increases greatly after age 60 (Anell et al 2012). Even though Swedish life expectancy remains one of the highest in the world, the male rate stands much more favorably.

The Swedish National Health Service ranks highly in the EU, OECD, and entire world due to the comprehensiveness which leads to positive health outcomes. The emphasis on primary care results in greater preventative care which high cancer rates and high-ranking health indicators reflect as health problems get addressed early. Policies and societal gender equality support better health outcomes in general, but especially for women. The generous parental leave policies support women in the formal work sector and support a more equal distribution of unpaid labor between men and women. This reduces gender-based pay gaps in the workforce, and later in life as pensions remain equal between men and women. Sweden ranks highly for gender equality, but inequalities are not erased. Disparities in smoking habits lead to a higher mortality rate in women above age sixty, compared to men of the same age. Nevertheless, the comprehensiveness and guaranteed access to care in Sweden supports better health outcomes.

Social Health Insurance System: Netherlands

The Netherlands has one of the most highly ranked healthcare systems in the world. The Dutch system relies on private actors – private insurers, independently employed doctors, privately owned nonprofit hospitals – within a tightly regulated system designed to ensure affordability and access (Scott 2020). The current system was adopted in 2006 in response to criticism of growing inequalities under the previous two-tiered health care system. Under the health insurance system implemented in 1941, 63% of the population was covered by a social health insurance program, with the remainder covered by private insurance. The most affluent opted for private insurance, which allowed them to receive higher quality of medical care. Doctors were paid better for treating wealthy patients than those covered by the social health insurance program, which was plagued by inefficiencies and long wait times. Meanwhile, the middle-class faced high out-of-pocket costs and a small percentage of the population still lacked insurance (Commonwealth Fund 2020; Scott 2020).

After concerns regarding inefficiencies and long waits arose, the 2006 Health Insurance Act merged the public and private insurance systems into one universal social health insurance system (Commonwealth Fund 2020). The new health insurance system requires everyone who legally lives or works in the Netherlands to purchase statutory health insurance from private insurers with the insurance companies being required to accept all applicants (van de Ven and Schut 2008). Children under 18 are automatically covered under their parents' insurance. In addition, those without health insurance are fined to incentivize people to purchase insurance, but at the same time undocumented immigrants cannot purchase insurance, leaving a gap in the insurance method (Commonwealth Fund 2020). To ensure that legal residents do not fall through any gaps, "the Netherlands fines people who don't carry insurance for up to six months and then

auto-enrolls them in an insurance plan, with premiums that are about 20 percent higher than they would have paid if they signed up during the regular enrollment period. A small number of people — about 200,000, or around 1 percent of the population — default on their premiums, and their wages are garnished to cover the cost of their insurance" (Scott 2020).

These private health insurance companies compete for business as the Netherlands has a deeply rooted capitalist tradition stemming from its history as a global power (Scott 2020). However, strict regulations exist to ensure equal access. The private insurance companies are obligated to provide a prescribed benefit package to everyone and cannot charge higher premiums due to health status: community rating keep premiums lower for sicker individuals, and cost sharing caps ~~to~~ simplify choice for beneficiaries (van de Ven and Schut 2008). These regulations also include a legal obligation to accept everyone. No exclusions can be made because of pre-existing conditions. Everyone is required to receive basic insurance contracts at a community-rated premium and the Risk Equalization Fund compensates insurers for enrollees with high medical expenses (van de Ven and Schut 2008). This leaves insurers with an incentive to compete on services and quality rather than by excluding people with higher health risks.

Given that the transition to the new system occurred only sixteen years ago, wealth disparities likely continue to exist within the Dutch population health due to the quality of health care, in addition to the health disparities which are typically seen between socioeconomic groups. The new healthcare system provides a more equal baseline of care as premiums remain the same for all enrolled regardless of age or health status. Within the new system, the biggest disparity likely comes as children transition to becoming an adult which comes with no longer being automatically enrolled as well as the requirement to pay premiums. In addition, the lack of support for undocumented immigrants creates a major gap in a country which prioritizes the

welfare of all as these immigrants do not have the opportunity to even obtain insurance. This forces undocumented immigrants into dangerous positions as they cannot seek needed healthcare and if forced to, must pay the exorbitant bills which are associated with uninsured care.

In the health system reform, Dutch legislation placed an emphasis on the municipalities to develop and implement local health policies (Hoeijmakers et al 2007). This legislation was introduced to place a greater emphasis on community involvement in the promotion of health services. Even though in theory this system was designed to improve local public health policy, lack of direction and the influence of personal interests resulted in negligible changes in healthcare. Previous research found that an absence of critical public health events and a lack of perceived economic opportunity discouraged policy makers from making health policy changes (Hoeijmakers et al 2007). This structure in theory would positively impact local communities given that policies can target specific municipal needs, but the lack of effective implementation results in wasted resources as well as a negative impact on patients given the opportunity lost to improve patient care.

The Netherlands offers a unique, broad system of universal healthcare. From 2006-2019, the Netherlands increased public spending for health care from 68% to 82%, resulting in much lower out of pocket costs at 10.6%. The VHI participation rate remains relatively high for a low out-of-pocket cost at 6.8% (OECD 2021b). This reflects the distinct three-part healthcare system as the social health insurance system mandates all Dutch residents to purchase insurance policies which are administered from competing health insurers to provide a basic level of care. This system allows the insurers to negotiate contracts and prices providing an economic competition not seen in other healthcare systems. However, this comes at the price of some financial barriers as insurance companies can only reimburse 75% of the cost for non-contracted providers and

those who choose to purchase cheaper insurance plans then face access barriers due to a more limited option for hospitals and providers (OECD 2021b). Dutch social health insurance covers specialist care, primary care, pharmaceuticals, medical devices, and adult mental health care. The second aspect of the Dutch healthcare system is a single-payer social insurance system which is used for long term care through a regional insurance provider. Finally, the last aspect is the tax-funded social care aspect, executed by municipalities, which covers screenings, vaccinations, and overall public health as regulated by the National Institute for Public Health and the Environment (OECD 2021b).

In comparison to other EU countries, the Netherlands is ranked lowest in inpatient care usage, fueling a strong outpatient care system. This can be reflected in the very low mortality rate from treatable causes such as ischemic heart disease, stroke, and pneumonia; however, the above-average mortality rate for colorectal and breast cancer accounts for more than 40% of treatable deaths (OECD 2021b). Participation in cancer screening remains similar in the Netherlands to the EU average but cervical cancer screening has fallen from 68% in 2007 to 56% in 2019 along with a similar decrease in breast cancer screening to 76%. Even with declining screening, five-year cancer rates for prostate, breast, and cervical cancer remain higher than the EU averages by 3-5% (OECD 2021b).

In the Netherlands, progress toward gender equality has been made but inequities still impact women disproportionately. Women spend 5.5% more of their time on unpaid work than men do. Further income gaps exist as 100% of eligible men receive unemployment, while only 73.6% of women do. On the other hand, 100% of eligible men and women receive pensions, making the Netherlands the best ranked out of these four case studies for pension equality (UN Women). This supports the findings of the European Institute for Gender Equality who reported

that women have slightly lower (4%) self-perceived health than Dutch men do (EIGE 2022). Financial barriers exist between men and women, but the main barrier appears to primarily affect vulnerable populations, such as the homeless, rather than all Dutch women.

A distinct gap between men and women's health has arisen over the 10-year period between 2010-2019. Male life expectancy increased by 1.7 years while women only gained 0.7 years. This year gap can also be seen in the EU average life expectancy where Dutch men live nearly two years longer than the EU average while Dutch women live about five months less than the EU average (OECD 2021b). This may be tied to the strain placed on the Dutch health care systems in recent years. Excessive wait times have been recorded for outpatient care systems with children facing wait times exceeding one year for mental health care (OECD 2021b). Additionally, discrepancies in healthier years exist between men (62 years) and women (60 years) in the Netherlands supporting previous points that women may live longer, but inequalities exist. Women may be facing their own extended waits for care, but the responsibility of childcare disproportionately falls on women so extended waits for children also will negatively impact women.

The Dutch health system combines the best aspects of public social health insurance and private economic competition among insurance companies. Some wealth disparities exist within the flexible, capitalistic insurance market, but social health insurance and guaranteed rates lessen the gap. Wealthier populations may opt for private insurance which provides expanded access to health services. Gender inequalities also exist as women take on more unpaid and do not receive unemployment at the same rate as men. Additionally, these disparities may impact the health of women as men's health has improved at a greater rate than women's health has, potentially due to the greater work burden and some financial barriers women may face. Regardless, the

Netherlands ranks highly for the well-structured healthcare system, with cancer survival rates above the EU average for all types, as well as life expectancies above average.

Quantitative Study

Theoretical Mechanisms

The case studies discussed above show that universal healthcare systems vary considerably in the extensiveness of their coverage and health outcomes. Part of this is attributable to differences in national income; Sweden and the Netherlands are much wealthier countries, which allows them to have higher healthcare expenditures per capita relative to Poland and Latvia. As universal healthcare systems, all four countries provide or mandate coverage for everyone, with government subsidies to ensure that this is affordable; however, the government's share of total healthcare expenditures varies considerably. Out-of-pocket payments range from a low of 10.6% of total health expenditure in the Netherlands to a high of 36% in Latvia. This raises questions about health equity.

In addition, while studies have found that gender equality generally has a positive effect on health outcomes, gender equality does not always produce superior health outcomes. While expanded opportunities for women in the workplace may produce health benefits, these can also create a double burden that impairs health outcomes; in many countries, women's paid work does not diminish their disproportionate share of unpaid domestic chores and care work. In addition, increasing gender equality may not translate into men decreasing risky health behaviors such as high rates of smoking and alcohol use. While countries like Sweden and the Netherlands have significantly closed gender gaps, this may not be enough to prevent women from having poorer health outcomes due to other factors that shape women's need for and access to health care (King et. al. 2018: 38).

This raises the question whether countries' reliance on voluntary private health insurance has a disproportionately negative impact on women's health outcomes. Public health insurance systems reduce inequality through providing a standardized quality of care for all. In turn, when health markets are liberalized through greater voluntary health insurance, inequalities arise due to financial barriers to purchasing the insurance. To purchase VHI, a person must have the financial means to do so either through a job which pays a sufficient salary to afford the insurance or through working for a higher quality employer who provides added private insurance. This leads to greater inequality in health outcomes.

VHI may have a disproportionate effect on women, as the gender wage gap and pension gaps create a barrier for women to obtain VHI (OECD 2022). Since supplementary VHI must be purchased, financial barriers will prevent women from purchasing it, when men can because they receive more income through higher wages or pensions. Additionally, employers make up a larger number of VHI purchasers so maternity leave and less formal sector participation may prevent women from having VHI. Supplementary VHI provides greater access to health care through added services or access to private doctors with shorter wait times. Women without VHI due to financial barriers lacking the opportunities to receive care from this sector creating a gender gap in health outcomes. This results in worse health outcomes for women as they do not have as timely access to providers, coverage for the same services, or access to potentially higher quality care when the public system is overburdened. A gap in health outcomes likely will be seen in health indicators which require specialized care as many public systems have overburdened and less accessible specialists, in comparison to primary care doctors. In a comparison of OECD countries, those with higher rates of supplementary voluntary health insurance participation will experience greater inequality in health outcomes than those with

lower rates of participation. Additionally, OECD countries with higher rates of supplementary voluntary health insurance participation will experience worse health outcomes for women due to the inequality.

Research Design

In order to examine what impacts voluntary health insurance has on health disparities, particularly women's health, a regression was used to analyze health outcomes and control for other explanatory variables. Additionally, the case studies added detailed process tracing in four cases to look for the impact of an increase in VHI on health inequities over time. This question follows a casual approach, but no counterfactuals are present as current data does not allow for the comparison of a health system with and without VHI. To account for this GDP per capita and gender inequality were included as explanatory variables to identify if alternative explanations influence VHI's impact on health outcomes and inequality.

To quantify the impact which VHI has on health inequalities, six linear regression models have been run. To test the hypothesis that greater rates of participation in voluntary health insurance leads to greater sex inequality within health outcomes, three dependent variables were tested against three independent variables. The difference between male and female rates of cardiovascular disease mortality and infectious disease mortality provided insight into non-communicable and communicable diseases. Maternal mortality provides a female-specific health indicator. All three of these dependent variables were run against VHI participation rates, the logarithm of GDP per capita, and the Gender Inequality Index, then rerun without the Gender Inequality Index. These six models will provide insight into the effect which VHI has on health outcome inequalities between men and women. Table 2 provides all variables taken into consideration when making the dataset.

Three different dependent variables are used to provide a more comprehensive picture of health disparities within a health system. The cardiovascular disease mortality rate reflects the aspects of health systems which prevent and treat non-communicable diseases. These outcomes

may differ between men and women due to lifestyle choices, which provides interesting insight into cultural practices. Eating habits, fitness, smoking, alcohol consumption, and stress all contribute to cardiovascular diseases. Preventative health care and public health measures which encourage healthy life choices, such as exercising and eating a healthy diet, have the greatest impact on reducing non-communicable disease mortality (WHO). This may vary by sex due to barriers in receiving health care. If income gaps or time prevents women from seeking preventative care, women may be disproportionately affected by cardiovascular diseases. Using this dependent variable provides insight into the quality of primary care as prevention remains the first line of defense against these non-communicable diseases. In addition, once a disease develops, primary care physicians typically provide routine care to prevent further deterioration of the disease. Next, the infectious disease mortality rate provides insight into the intersection of health levels as varying levels of care may be employed depending on the severity of the infectious disease. Infectious diseases traditionally affect men more often than women due to biological and sociocultural factors. The immune systems of women have been identified as more efficient leading to lower rates of infection and quicker turnaround in clearing infections (van Lunzen and Altfeld 2014). Socially, men are more likely to work in jobs where they will be exposed to pathogens and may be less likely to take time off from work when sick. Some infectious diseases may be treated by a primary care physician initially, but once the disease increases in severity, a hospital or other form of acute care likely provides the care. Lastly, maternal mortality reflects a general access to care as preventative care prevents high risk pregnancies, emergency care treats emergent complications during pregnancy, and post-childbirth care provides the final care for any further complications. Maternal mortality also

provides insight into female-specific care, allowing for this sex-specific health indicator to be compared across countries in the OECD.

The independent variables measure the effect of VHI on sex-based differences in health outcomes while controlling for GDP per capita and the Gender Inequality Index. When analyzing the effect of a country's VHI participation rate on health inequalities, GDP per capita provided an alternative explanation for why some countries may have better health outcomes and equality than others. Additionally, GDP per capita may be tied to VHI spending as populations with greater wealth may be more inclined to purchase a supplemental insurance or have employers who provide private insurance. However, even in wealthy countries, distribution of wealth may prevent some from affording VHI or adequate coverage. Next, the Gender Inequality Index reflects the degree of gender inequality within countries, including reproductive health, empowerment, and labor market statistics. Women in countries with less gender inequality may also face factors which cause them to have more health concerns. These variables provide insight into alternate explanations to help ensure that the measured effect of voluntary health insurance on health inequality truly is explained by VHI and no other social factors.

The predicted relationship between the dependent variables and independent variables would be reflected through a negative sign for the b coefficient of VHI for the differences in cardiovascular diseases and infectious disease mortality. The maternal mortality regression would support the hypothesis with a positive b coefficient for the VHI coefficient. Each regression analysis can be reflected in the following six model equations:

Equation 1.
Difference in Cardiovascular Disease Rate = $a + b_1$ Voluntary Health Insurance + b_2 Gender Inequality Index + b_3 Logarithm of GDP per capita

Equation 2.
Difference in Cardiovascular Disease Rate = a + b_1 Voluntary Health Insurance + b_2 Logarithm of GDP per capita

Equation 3.
Difference in Infectious Disease Mortality Rate = a + b_1 Voluntary Health Insurance + b_2 Gender Inequality Index + b_3 Logarithm of GDP per capita

Equation 4.
Difference in Infectious Disease Mortality Rate = a + b_1 Voluntary Health Insurance + b_2 Logarithm of GDP per capita

Equation 5.
Maternal Mortality Rate = a + b_1 Voluntary Health Insurance + b_2 Gender Inequality Index + b_3 Logarithm of GDP per capita

Equation 6.
Maternal Mortality Rate = a + b_1 Voluntary Health Insurance + b_2 Logarithm of GDP per capita

Variable Overview

Table 2. Regression analysis variables with abbreviation, description, and source.

Variable	Abbreviation	Description	Data Source
Country	country	Name of OECD country	OECD
Voluntary Health Insurance	VHI	Voluntary Supplemental Health Insurance Coverage as a percentage of the population	OECD
Male Death Rate Due to Cardiovascular Diseases	MCDR	Measured as a rate per 100,000	Institute for Health Metrics and Evaluation
Female Death Rate Due to Cardiovascular Diseases	FCDR	Measured as a rate per 100,000	Institute for Health Metrics and Evaluation
Difference between Sexes for Cardiovascular Disease Mortality	DCDR	Difference between the Male death rate and Female death rate	Institute for Health Metrics and Evaluation
Male Death Rate Due to Infectious Diseases	MIDR	Measured as a rate per 100,000	Institute for Health Metrics and Evaluation
Female Death Rate Due to Infectious Diseases	WIDR	Measured as a rate per 100,000	Institute for Health Metrics and Evaluation
Difference between Sexes for Infectious Disease Mortality	DIDR	Difference between the Male death rate and Female death rate	Institute for Health Metrics and Evaluation
Maternal Mortality	MM	The number of women who die from a pregnancy related cause while pregnant or within 42 days of pregnancy termination per 100,000 live births	Our World in Data
GDP per Capita	GDPpc	Measure of gross domestic product per person within a country	World Bank
Log GDP per capita	GDPpc_log	GDP per capita as a logarithmic function	World Bank
Gender Inequality Index	GII	A measure of gender inequality using reproductive health, empowerment, and the labor market	United Nations Development Programme

Bivariate Relationships

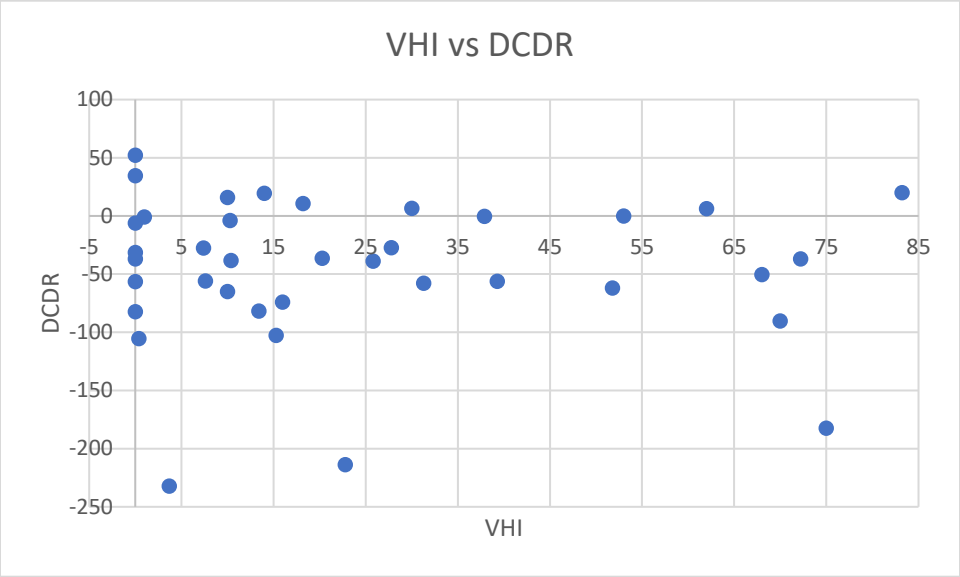

Figure 1. Scatterplot of voluntary health insurance in comparison to differences in non-communicable disease mortality rates between males and females.

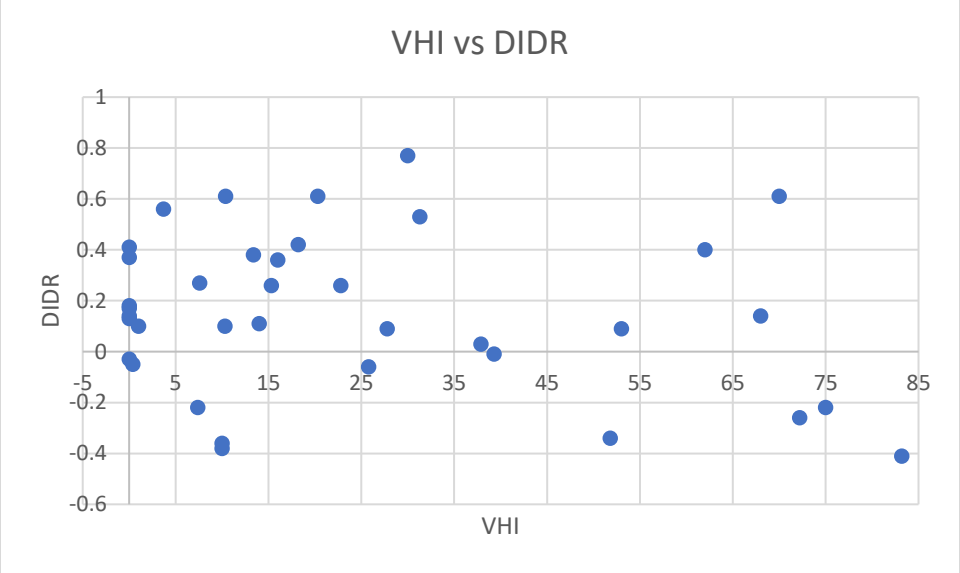

Figure 2. Scatterplot of voluntary health insurance in comparison to differences in infectious disease mortality rates between males and females.

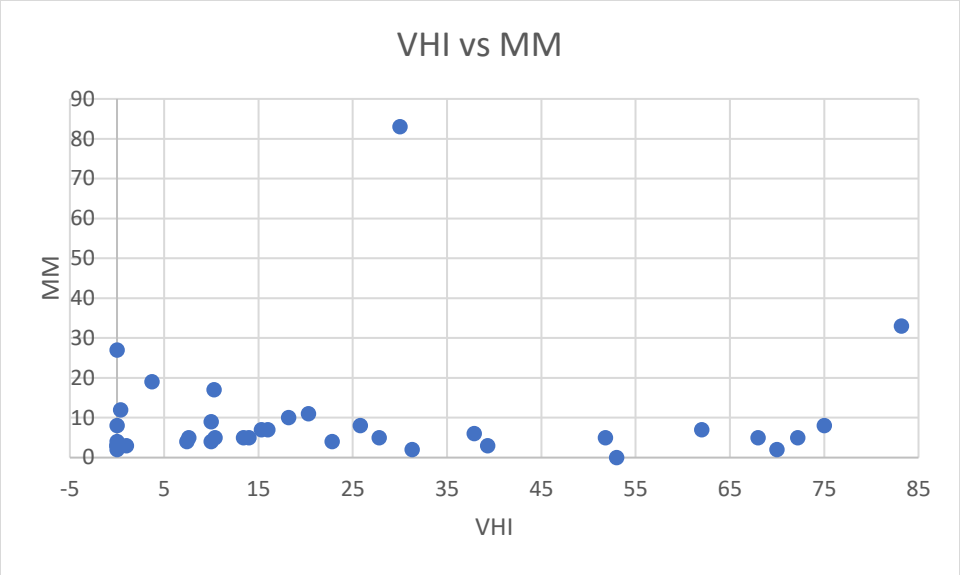

Figure 3. Scatterplot of voluntary health insurance in comparison to maternal mortality.

To better understand the data distribution on health inequalities, scatterplots between the independent and varying dependent variables have been formulated. In formulating the difference in cardiovascular and infectious disease mortality rates, the female mortality rate was subtracted from the male mortality rate. This means that positive values signify a higher rate of male mortality while a negative rate signifies greater female mortality for Figure 1 and Figure 2. Maternal mortality was measured as the number of women who die from a pregnancy related cause while pregnant or within 42 days of pregnancy termination per 100,000 live births as shown in Figure 3 (Our World in Data 2013). All variables were plotted against the percentage of voluntary health insurance participation in each OECD country.

Figure 1 shows the greatest dependent variable distribution with the range varying from +52 to -232. Twenty-six of the thirty-seven data points fell into the negative half of the scatterplot showing that generally females had a higher mortality rate than males for cardiovascular diseases. The VHI participation rate had a cluster at zero with greater density at lower rates of participation but an even distribution as the number increased. This means that

many countries had a VHI participation rate of approximately zero and most if not zero, had low rates of participation. Less countries had a VHI participation between 35%-83% but those that did were distributed across that range. Figure 2 shows a greater rate of male mortality from infectious diseases since only ten data points fell into the negative region. Figure 3 shows two outlier points for voluntary health insurance participation vs maternal mortality. One occurs at 83% VHI participation and 33 maternal mortality deaths per year. The other outlier occurs at 30% VHI participation and 83 maternal mortality deaths. This corresponds to the Netherlands and Colombia showing that large differences occur in maternal mortality regardless of the VHI rate. The rest of the data falls below 30 maternal mortality deaths distributed across the spread of VHI participation. These scatter plots show the data range which the regression analysis will be performed on to visualize the data distribution for potential relationships.

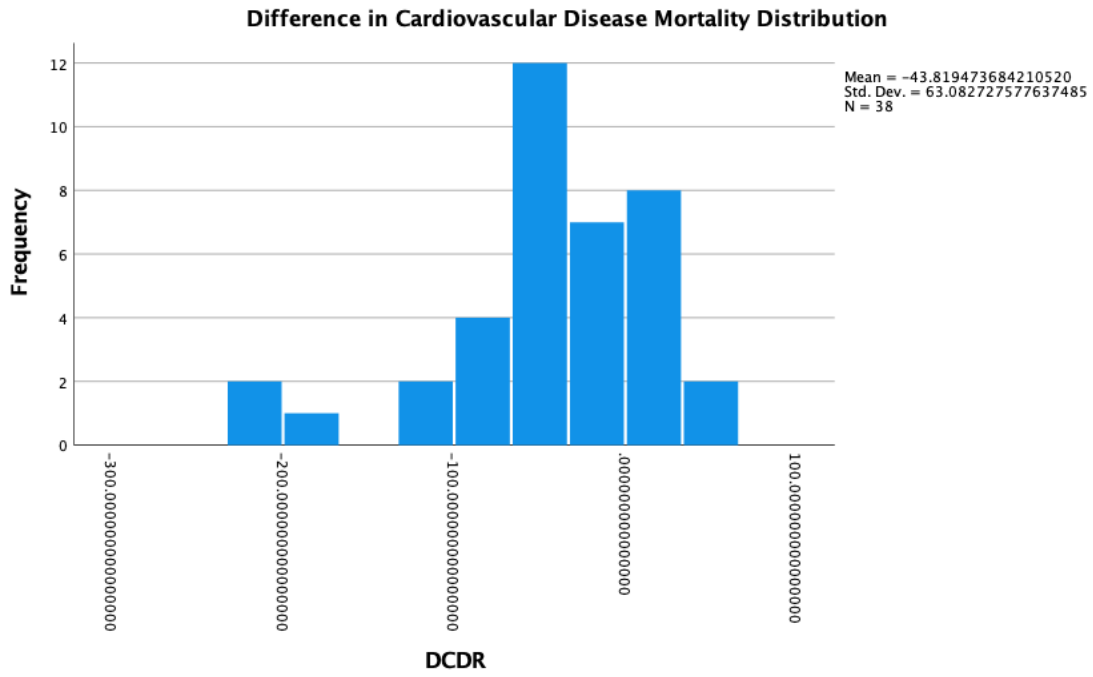

Figure 4. Histogram distribution regarding the difference between the male and female mortality rate from cardiovascular diseases.

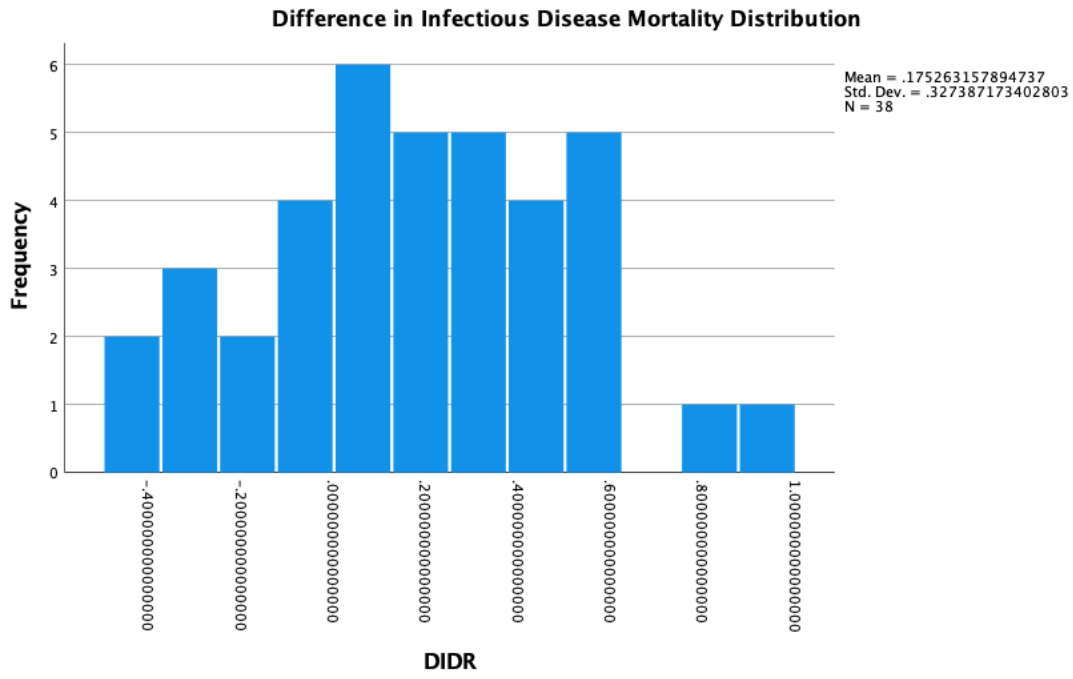

Figure 5. Histogram distribution regarding the difference between the male and female mortality rate from infectious diseases.

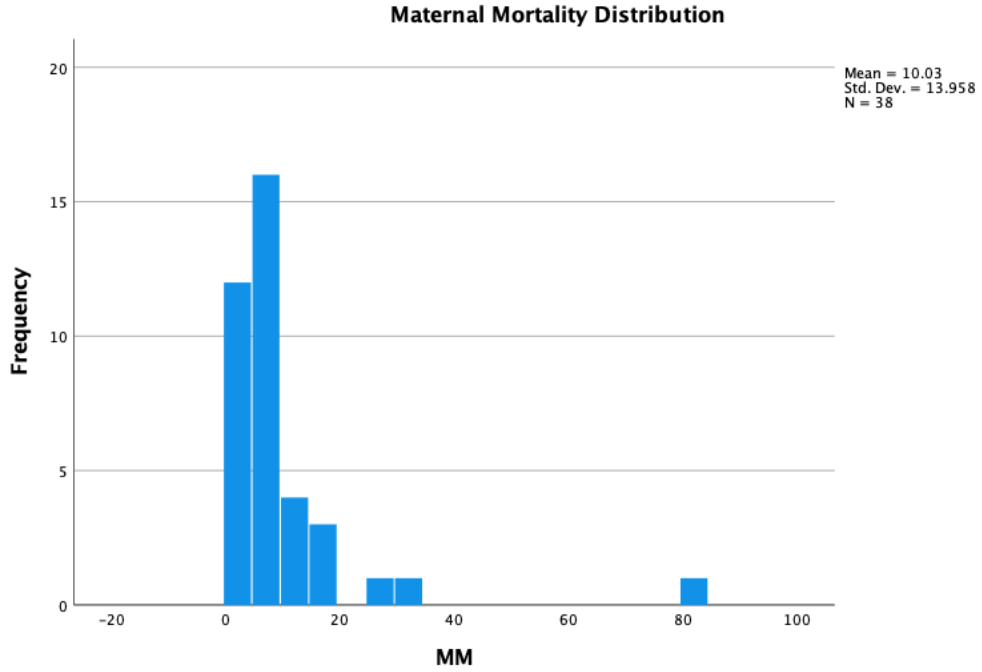

Figure 6. Histogram distribution regarding the maternal mortality rate.

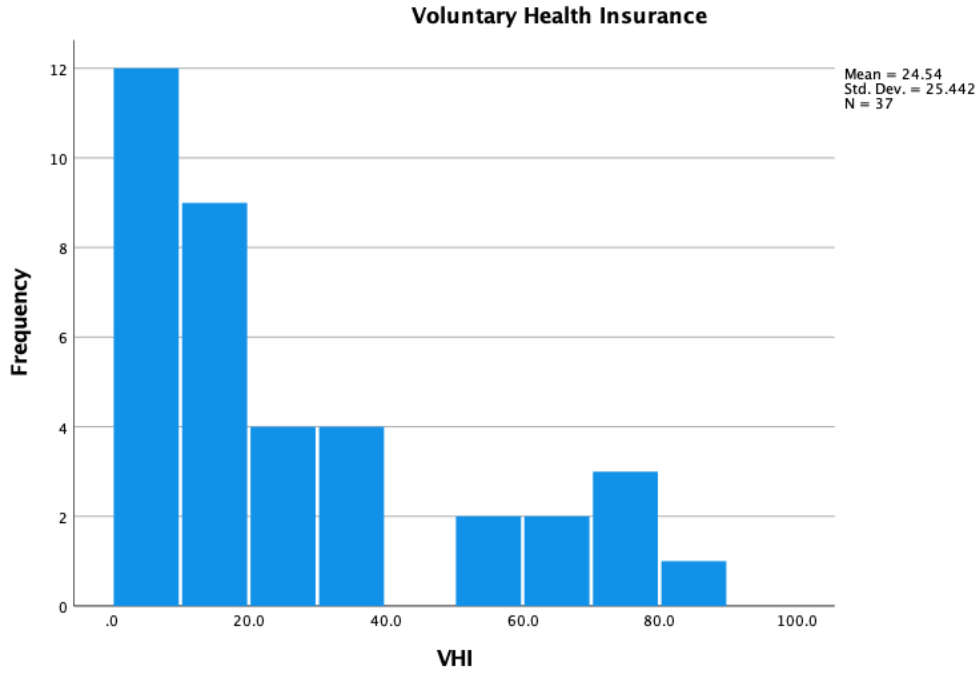

Figure 7. Histogram distribution of voluntary health insurance participation.

The histograms supplement the visualizations of the data distributions shown in Figures 1, 2, and 3. Figure 4 supports the conclusions from Figure 1 with most of the distribution falling below zero. A few countries had a difference in cardiovascular disease rates around -200 but the remining data had a standard bell curve between -100 and 100 slightly skewed toward the negative values as displayed by the -43 mean. Figure 5 shows that most values fall between 0.0 and 0.6 with a mean of 0.175 with an overall even distribution within a small range between -0.41 and +0.9. Figure 5 shows the outlier values seen in Figure 3 with the most values below 20 as the mean fell at 13 then a few data points fell around 30, then the outlier at approximately 80. Lastly, Figure 6 displays the distribution of VHI participation within the OECD. Most countries have participation rates below 20%, with zero being the most common. The participation above 20% had a wide distribution up to above 80% as displayed by the large standard deviation of 25. These histograms also display the range of the data set for each with the difference between sex

for cardiovascular disease having the greatest difference in the spread of data while the difference between sex for infectious diseases having a very small range.

Regression Analysis

Table 3. Descriptive statistics for the regression reported in Table 3, 4, 5.

	N	Minimum	Maximum	Mean	Std. Deviation
Difference between Sex in the Cardiovascular Disease Mortality Rate	37	-232.26	52.02	-45.18	63.38
Difference between Sex in the Infectious Disease Mortality Rate	37	-.41	.900	.156	.309
Maternal Mortality	37	2	83	8.05	2.956
Voluntary Health Insurance	37	.000	83.2	24.54	25.44
Gender Inequality Index	37	.013	.424	.100	.074
Logarithm of GDP per capita	37	3.79	5.13	4.66	.201
Valid N (listwise)	37				

Table 4. Regression analysis of the difference in the cardiovascular disease mortality rate between men and women.

	Coefficient	**Coefficient**
Voluntary Health Insurance	.642	.621
	(.433)	(251.3)
Gender Inequality Index	172.6	-
	(207.2)	-
Logarithm of GDP per capita	40.9	-3.90
	(76.7)	(54.4)
Constant	-268.8*	-42.24
	(371.18)	(251.3)
N	37	37
Adjusted R^2	-.004	.005

Notes: Dependent variable is difference in the cardiovascular disease mortality rate between men and women; analysis is shown with and without the Gender Inequality Index; standard errors are reported in parentheses.
*Absolute t-value > 2.

Table 4. Regression analysis of the difference in the infectious disease mortality rate between men and women.

	Coefficient	**Coefficient**
Voluntary Health Insurance	.000	.000
	(.002)	(.002)
Gender Inequality Index	1.19*	-
	(.732)	-
Logarithm of GDP per capita	-.736*	-1.05*
	(.271)	(.198)
Constant	3.48*	5.04*
	(1.31)	(.913)
N	37	37
Adjusted R^2	.515	.445

Notes: Dependent variable is the difference in the infectious disease mortality rate between men and women; analysis is shown with and without the Gender Inequality Index; standard errors are reported in parentheses.
*Absolute t-value > 2.

Table 5. Regression analysis of maternal mortality.

	Coefficient	**Coefficient**
Voluntary Health Insurance	.076*	.066
	(.026)	(.039)
Gender Inequality Index	81.6*	-
	(12.3)	-
Logarithm of GDP per capita	-.483	-21.7
	(4.57)	(4.89)
Constant	.355	107.46
	(22.1)	(22.6)
N	37	37
Adjusted R^2	.704	.332

Notes: Dependent variable maternal mortality; analysis is shown with and without the Gender Inequality Index; standard errors are reported in parentheses.
*Absolute t-value > 2.

Quantitative Findings

The regression analysis found no significant data between VHI and sex-based health inequalities. The sex-based difference in cardiovascular disease rate had no significant relationships with any variables. Infectious disease inequalities had significant relationships with GII and GDP per capita, but not VHI. Lastly, maternal mortality had a significant relationship with VHI when the GII variable was included, but no relationship when the variable was removed. This likely means the result was due to endogeneity. Tables 4, 5, and 6 display the results from the six regression analyses run with the three dependent variables. Each table displays two regression analyses, one controlled for the gender inequality index and one without the gender inequality index because the index was calculated using data regarding reproductive health, empowerment, and the labor market. The analysis used the logarithm of GDP per capita to account for the exponential growth which occurs for GDP. This logarithmic value normalizes the large GDP values to a smaller, more representative number of the change.

Table 3 provides the descriptive statistics for each of the variables. A sample size of 37 was used, as shown by the N values. The maximum, minimum, mean, and standard deviation values for each dependent and independent variable are provided. The difference in the cardiovascular disease rate between the sexes (DCDR) displayed the greatest variation with a maximum and minimum 52.02 and -232.26. The standard deviation value of 63.38 further confirms the variation. The mean of the DCDR variable fell at -45.18 displaying that on average, 45 more women than men died from cardiovascular diseases. The difference in the infectious disease rate between the sexes (DIDR) had a small range with the maximum and minimum falling at .900 and -.410. A mean of .156 was identified, showing that slightly more men than women die from infectious diseases. The standard deviation of .309 shows much less distribution

relative to the DCDR variable. Lastly, maternal mortality (MM) had a maximum and minimum of 83 and 2 with a mean of 8.05. The standard deviation of 2.956 supports earlier conclusions that most data points fell close to the mean with a few outlier points.

In addition to the descriptive statistics of the dependent variables, Table 3 also provides the statistics for the independent variables. The voluntary health insurance (VHI) variable ranged from a minimum of .000 to a maximum of 83.2. Within the OECD, the mean VHI participation was 24.54% with a standard deviation of 25.44. The Gender Inequality Index ranged from .013 to .424 with a mean of .100. The complete index with all countries goes from 0 to 1 with 1 signifying the greatest inequality. With the standard deviation of .074, the OECD countries all rank towards equality. Lastly, the logarithmic value of GDP per capita ranged from 3.79 to 5.13. The variable had a mean of 4.66 with a standard deviation of .201.

Table 4 displays the results of the regression analysis between the difference in cardiovascular disease mortality rates between men and women and the independent variables. Two regression analyses were run, one with the gender inequality index and one without. Given that the gender inequality includes female health outcomes, it potentially may influence the results of the regression analysis given the measurement of sex inequality in health outcomes. This likely is due to endogeneity as the maternal mortality variable can be a predictor of the GII variable, and not just an outcome. For both regression analyses, none of the independent variables had an absolute t value greater than 2 meaning the results were insignificant. For the regression including the gender inequality index, the constant value had an absolute t value greater than 2 displaying that the constant starting value is approximately -268.8. The adjusted R^2 values were -.004 and .005 signifying that the data had a poor fit to the predicted regression equation.

Table 5 displays the results of the regression analysis between the difference in the infectious disease mortality rate between men and women and the independent variables. For both the regression analyses, with and without the gender inequality index, the logarithm of the GDP per capita and the constant values had t values greater than 2. The VHI variable had a coefficient of .000 in both regression analyses. The gender inequality index had a coefficient of 1.19 with a t value greater than 2. With the GII, the logarithm of GDP per capita had a coefficient of -.736 with a t value greater than 2. Without the GII, the logarithm of GDP per capita had a coefficient of -1.05 with a t value greater than 2. The constant had t values greater than 2 for both regression analyses. The coefficient for the constant was 3.48 with the GII and 5.04 without the GII. The regression analyses had an adjusted R^2 of .515 with the GII and .445 without the GII.

Lastly, Table 6 displays the results of the regression analysis between maternal mortality and the independent variables. The first maternal mortality regression shows that in a comparison of two countries, a country with a one-standard deviation (25 percentage points) higher VHI has a higher maternal mortality rate of almost 2 deaths per 100,000 births. This is a meaningful difference. In the analysis with the gender inequality index, the voluntary health insurance had a coefficient of .076 with a t value greater than 2. The gender inequality index had a coefficient of 81.6 with a t value greater than 2. The logarithm of GDP per capita had a coefficient of -.483 and the constant had a coefficient of .355 without a significant t value. The second maternal mortality regression shows that in a comparison of two countries, a country with a one-standard deviation (39 percentage points) higher VHI has a higher maternal mortality rate of 2.5 deaths per 100,000 births. This was not a meaningful difference, however. Without the GII, the voluntary health insurance coefficient was .066 without a significant t value. The logarithm of GDP per capita had

a coefficient of -21.7 and the constant had a coefficient of 107.46 without a significant t value. The adjusted R^2 with the GII was .704 but .332 without the GII.

Discussion

The case studies and regression analysis provide a comprehensive analysis regarding health system structure, VHI participation, and health inequalities. Both the Netherlands and Poland have similar voluntary health insurance participation rates but have wide ranges of public perception of healthcare quality. In a 2009 poll, perceptions that the quality of health care is bad range widely, from 9% in the Netherlands and 10% in Sweden, as compared to 62% in Latvia and 67% in Poland. along with complaints regarding unmet medical needs caused by wait times among other factors (Sagan and Thomson 2016). This potentially supports the argument from Brekke and Sorgard that too much overlap between the public and private sectors can diminish the availability of physicians and access to healthcare. When physicians spend too much time working in both sectors, there are not enough physicians to treat the patient demand on both sides. Typically, because of higher salaries in the private sector, the private sector then predominates, resulting in decreased public sector care. This further incentivizes VHI participation to gain access to the stronger health amenities of the private sector. This in turn fuels socioeconomic inequalities, impacting both genders, decreasing the equality that is supposed to be established by universal healthcare.

Both Latvia and Sweden lack significant VHI participation with rates from one to three percent, but the coverage from universal healthcare varies drastically as Latvians pay over double the out-of-pocket fees than the Swedes. The low preventative screening care participation rates in Latvia reflect the effects of the high costs for health visits. Sweden comparatively boasted the highest rate of breast cancer screening in the EU, vastly different from Latvia. Even with similar VHI participation rates, the health outcomes for women show stark differences. This leads to a potential conclusion that VHI participation does not primarily affect health

inequalities, rather the overall extensiveness of health coverage. The effect of overall health coverage was demonstrated by the Netherlands and Sweden as the two countries differed in VHI participation by 7%, yet displayed some similarities in health outcomes (OECD, 2021b, d). Both countries ranked highly for overall indicators of health across the board but both countries also had similar GDP per capita values. Further research will need to be done controlling for income as income affects health outcomes.

The most interesting comparison came between the Netherlands and Latvia as both countries displayed gender health inequalities between men and women, regarding life expectancy and cancer rate. Even though Latvian women live longer than men, the cancer survival rates fell below the EU averages while the male specific cancer survival rate ranked above the EU. The Netherlands, on the other hand, ranked similarly between male and female specific cancers, but the female life expectancy growth rate fell behind the growth of men by a year. Specifically, regarding healthcare systems, Latvia and the Netherlands function very differently as the Latvian system has a higher VHI participation rate while the Netherland's public sector covers a greater amount of costs and services. Table 1 also shows that these disparities occurred in countries with vastly different gender inequality index scores. This suggests that gender inequalities arise regardless of the healthcare system structure, potentially signifying that gender health disparities are caused by alternate explanations, such as education and income. This may also be due to a double burden of men's failure to assume more responsibility for a higher proportion of domestic chores and continued risky health behaviors by men.

The importance of comprehensive health coverage was displayed by Sweden in comparison to the Netherlands. Even though the out-of-pocket costs were higher in Sweden than

the Netherlands, Sweden still had the best health outcomes and equality. Sweden also had a small voluntary health insurance market, signifying that health outcomes and equality are not reliant on supplemental insurance coverage. Both countries also had nearly equivalent incomes and gender inequality index values, displaying that the differences in public health insurance coverage made a difference in health outcomes and inequality. These cases displayed the importance of comprehensive universal healthcare coverage as Sweden boasted the best health outcomes regardless of the VHI participation and without supplemental health insurance participation.

A further conclusion can be drawn regarding the impact of expanded universal healthcare coverage as clear similarities can be drawn between Sweden and the Netherlands. The improved health outcomes and equality appear to be attributed to access and affordability, at least to some extent. The similar rankings between Latvia and Poland display an affordability gap as both rely on high out-of-pocket payments. Countries with greater universal healthcare coverage appear to have less inequalities relative to systems with lesser coverage regardless of the voluntary private insurance due to the standardization and greater reach of the care. Voluntary health insurance appears to supplement universal health care, but a major gap exists when universal healthcare ends, resulting in high out-of-pocket costs either directly to healthcare providers or private health insurance providers, preventing some in need from seeking care.

Further supporting these conclusions, the quantitative analysis found no ties between voluntary health insurance participation and sex-based inequalities in non-communicable disease, infectious disease, and maternal mortality rates. The first set of linear regression analyses found no significant relationship between differences in mortality and voluntary health insurance participation, the gender inequality index, and the logarithm of GDP per capita. This

may be due to the small sample size as too much random noise could be picked up in the regression analysis. The lack of relationship between the control independent variables and the dependent variable was unsurprising due to the prevalence of non-communicable disease regardless of country income. Non-communicable diseases are typically influenced by lifestyle habits, such as diet and exercise, in which disparities arise everywhere.

The second set of regression analyses shown in Table 5 showed relationships different from zero for the gender inequality index and logarithm of GDP per capita. Voluntary health insurance did not have a statistically significant relationship. The gender inequality index had a coefficient of 1.19. This means that in a comparison of countries, a country with a 1-point higher gender inequality index rating would see an increase of 1.19 increase in male mortality from infectious diseases. This aligns with the index as greater gender equality results in a decrease in female mortality from infectious diseases. On the contrary, a 1-point increase in the logarithm of GDP per capita results in a -.736 (with GII) or -1.05 (without GII) change in infectious disease mortality. This means that greater female mortality occurs with an increase in GDP per capita growth as the difference was calculated through subtracting the female rate from the male rate, meaning a positive coefficient signals greater male mortality and a negative coefficient signals greater female mortality. This may be due to greater gender-based pay gaps which increase men's ability to afford healthcare relative to women who may be making less money ~~relatively~~.

The final set of regression analyses show potential relationships between voluntary health insurance and the gender inequality index. When including GII in the regression analysis, the voluntary health insurance coefficient had a non-zero relationship as a country with a 1 percentage point higher VHI participation rate sees a .076 increase in maternal mortality. The gender inequality index coefficient also had a non-zero relationship as an increase of 1 in the GII

resulted in an increase of 81.6 women dying from maternal related causes. This analysis may not be accurate, however, due to the inclusion of women's health indicators in the gender inequality index. The GII was compiled using measurements from reproductive health, empowerment, and the labor market. Maternal mortality likely was included in the reproductive health data used. This makes the gender inequality index a poor indicator to be used in this specific regression analysis as the data is oversaturated with the same indicators resulting in inaccurate results. There may truly be a relationship between voluntary health insurance and maternal mortality, but when removing the GII, too much noise resulted in a relationship equal to zero due to the small sample size.

To further draw conclusions, expanding the dataset to include all countries would provide more concrete data. The current small dataset results in random noise, making a significant relationship more difficult to detect. An expanded statistical analysis would allow for additional external variables to be controlled for when analyzing the relationship between voluntary health insurance and health inequality while increasing the sample size. Additionally, this question follows a casual approach, but data for counterfactuals were out of the scope of this research project so in the future, a new research design would be beneficial. Looking at datasets before and after a private VHI market was implemented would provide more concrete data on how VHI impacts a country. Data from regions within a country with and without widespread VHI participation would also provide a better representation of the impact VHI has as the current data does not allow for the comparison of a health system with and without VHI.

Conclusion

This study builds on existing literature demonstrating a strong association between universal health care and better health outcomes. Among countries with universal health care systems, those that provide the most comprehensive public health insurance coverage produced better health outcomes than countries with less public coverage, even if out-of-pocket costs were slightly lower as displayed by Sweden and the Netherlands. Generally, countries with less public coverage and higher out-of-pocket costs than the OECD average experienced poorer health outcomes. These trends occurred regardless of the voluntary private health insurance participation, displaying that supplemental insurance does not play a large role in health outcomes. Eastern Europe specifically tied high out-of-pocket costs due to low public healthcare coverage and accessibility issues to worse health outcomes, likely exacerbated by high gender gaps due to financial inequalities. The Netherlands provided a unique example with high levels of male health in a comprehensive mixed system with just average health outcomes for women. In comparison, the lowest gender inequalities were found in countries with the highest public healthcare coverage regardless of the private health insurance prevalence.

The linear regression analyses found no significant relationship between voluntary health insurance and sex-based differences in health outcomes. No relationships were found between the difference in cardiovascular disease mortality and voluntary health insurance, the gender inequality index, or growth in GDP per capita. The infectious disease mortality difference rate regression found non-zero relationships between the gender inequality index and GDP per capita growth. No significant relationship was found with voluntary health insurance participation. Lastly, a non-zero relationship was found between both voluntary health insurance and the gender inequality index on the maternal mortality rate. However, the inclusion of maternal

mortality in the calculation of the gender inequality index makes these results skewed. Removing the gender inequality index from the regression resulted in a relationship equal to zero for voluntary health insurance and maternal mortality. This research provides evidence supporting greater comprehensive health care coverage, regardless of the voluntary health insurance participation rate.

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