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SHAPING POLICY IN THE ANTHROPOCENE: GENDER JUSTICE AS A SOCIAL, ECONOMIC AND ECOLOGICAL CHALLENGE

A Dissertation Presented

by

Phoebe Spencer

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ABSTRACT

Environmental pressures such as natural disasters, resource scarcity, and conflict related to climate change have emphasized the importance of considering social justice within its ecological context. Gender inequality is one type of injustice that has traditionally been addressed as a social matter, yet gendered divisions in bargaining power, mobility, and access to resources are exacerbated by environmental instability. One barrier to gender equity in the face of a changing climate is the mainstream economic paradigm, which promotes growth and individualism, often at the cost of environmental and social wellbeing. The issue of gender inequality in the Anthropocene, the proposed geological epoch highlighting human impact of earth systems, is explored here in three parts. The first section identifies opportunities for feminist and ecological economics to assimilate notions of justice in mainstream economic thought. The second considers dynamics of gender equality through an econometric analysis of macroeconomic effects of traditionally female-dominated unpaid care work. Finally, the third part investigates national progress toward the maternal mortality reduction target set in the United Nations' Millennium Development Goals and proposes a gendered perspective for the newly implemented Sustainable Development Goals. The dissertation concludes with a discussion of policy implications for national and international development institutions as they seek to improve gender equity in diverse social and ecological contexts.

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CHAPTER 1: INTRODUCTION

1.1. Problem Statement

The division of gender roles, societal constructs and norms of gendered behavior, and gender- and sex-based discrimination are not new concerns. Sexual divisions of labor, for instance, have long been noted by archaeologists to have existed among ancient peoples (for example, conspicuously referenced in Lee & DeVore's 1968 book, *Man the Hunter,* and its many responses including Dahlberg's 1983 work, *Woman the Gatherer*). Inequalities arising from the social constructions of gendered roles are manifest today not only in continued divisions of expected responsibilities, but in rights and justice as well. On a global scale, equity issues are seen through differentials between earnings for women and men, that women are less likely to graduate from educational programs in engineering, manufacturing, and construction (United Nations Statistics Division, 2015c), and that life expectancy is generally higher for women due to biological and lifestyle factors (United Nations Statistics Division, 2015a). Gender disparities can be particularly dire in developing countries, seen in ongoing female genital mutilation practices in Africa and Western Asia and high child marriage rates in Southern Asia and Sub-Saharan Africa (United Nations Statistics Division, 2015c).

At the same time, global environmental issues including climate change and resource scarcity are at the forefront of much political and scientific discussion, as these issues affect and are exacerbated by human activity. Natural and social scientists have highlighted this human-earth relationship and particularly the negative human impacts on earth systems as a proposed geological epoch, the Anthropocene. In this new age,

initiated by irreversible environmental damage, human social systems are not only under tension from political and economic conflict, but also subject to pressures of shifting resource availability and natural disaster risk. Justice is of particular concern in light of these changes, as the effects of environmental stress are not evenly distributed across the planet (Adger, Barnett, Chapin, & Ellemor, 2011; D. S. G. Thomas & Twyman, 2005). Beyond geographical inequalities in environmental changes, systemic disparities in resource allocation and use perpetuate at many scales based on factors such as gender, race, and ethnicity (Marino & Ribot, 2012; J. Z. McDowell & Hess, 2012). Such disparities also reflect macro trends in inequalities for economic resources (Gill & Roberts, 2011). Given the complex relationship between environmental shifts, economics, and justice, it is no wonder that gendered inequalities are worsened by the social strains of negative environmental impacts, and that the current macroeconomic paradigm is unprepared to resolve this issue.

Although theories of justice once played a central role in mainstream economics, the current neoclassical paradigm has become a barrier to social equity within an ecological framework through the prioritization of financial growth and individualism, often at the cost of a healthy planet and society. Intergroup inequalities are perpetuated by this system, including differences in the opportunities and outcomes available to different groups (see Berik, van der Meulen Rodgers, & Seguino, 2009), inequitable social mobility and wellbeing related to the growth of capabilities (Berik et al., 2009), and unequal access to critical resources (Shiva, 1993). These inequalities are fueled further by the explanations of discrimination as a market mechanism reflecting profit

maximization (see Saunders & Darity, 2003) and the explanation of distributional equity as a social cost and trade-off for an ultimate goal of efficiency (Feiner & Roberts, 1990). This prioritization of maximized (or optimized) outputs for the lowest cost has negative impacts on the equitability of distribution, described as "social efficiency" (Penz, Drydyk, & Bose, 2011). As Saunders & Darity describe, "By treating race and gender discrimination as an outcome of rational choices or of market failure of some type, neoclassical economics constructs a narrative that renders discriminatory behavior less tangible, more inconsequential, and ultimately justifiable." (2003, p. 105). Beyond this implicit tension with equity, mainstream economics has long isolated itself from other disciplines in a manner that is inconsistent with the complex socio-ecological nature of the causes and effects of injustice (see for instance Fourcade, Ollion, & Algan, 2015; Nelson, 2013).

In order to address equity concerns in a socio-ecological manner, policy agendas at all levels of governance must modify or replace mainstream economic thinking to incorporate justice. Alternative frameworks to neoclassical economics exist without broad political support, yet these could provide key strategies for moving to a just and sustainable future. Feminist economists, for example, have rejected notions of monetary wealth as the main goal for individuals, instead promoting economic activity that serves psychic income as enjoyment gained from goods and services (England & Folbre, 2003; Lawn, 2005). By incorporating this and other heterodox thinking in global policy and the economic mainstream, inequalities may be better addressed.

1.2. Overview of Study

Through this dissertation, the relationship between neoclassical economics, environment, and gender equality are explored with the intention of moving toward a more equitable and sustainable global development paradigm. The issue of macroeconomic gender inequality in the Anthropocene is explored here through three major research questions:

1.) What issues have caused dominant economic paradigms to resist justice as a significant concern?

Objectives:

- Explore the relationship between justice, gender, and mainstream economics, as well as the slow adoption of feminist theory in the field of economics in comparison with other social sciences;
- Understand how the evolution of mainstream economic theory has led to current treatments of justice; and
- Suggest steps toward an economic paradigm that better incorporates justice.

2.) How do macroeconomic systems contribute to gender inequalities?

Objectives:

- Explore the role of unpaid care work and social investment in human development (also known as the reproductive sector) across more than sixty countries;

- Model the relationship between economic development, paid work, and unpaid work, with attention to the gendered dynamics of paid and unpaid work; and
- Highlight unpaid work as a global inequality that requires not only traditional solutions of increased social investment and development, but also changes in social attitudes toward gendered divisions of work.

3.) Are international development agendas that address gendered health outcomes at the national level effective, and if not, what could better improve women's health outcomes?

Objectives:

- Understand a gender equity issue (maternal mortality) as a part of the Millennium Development Goal and Sustainable Development Goal campaigns, including the transition between agendas;
- Explore national maternal health programs worldwide, assessing how traditional health metrics and environmental factors reflect maternal mortality rates; and
- Provide recommendations for policymakers to effectively move toward decreased maternal mortality rates.

These research questions are addressed through three approaches: first, with a theoretical discussion of the trajectory of neoclassical economics and justice; second, using simultaneous equations to econometrically model the relationship between

development and the reproductive sector; and third, through rank-sum testing of health and environmental indicators for two groups of countries with above-and below-global average maternal mortality rates. Data for the econometric model was gathered for sixty-two countries, including information related to unpaid time-use, public spending, education, macroeconomic development, and labor. This information was gathered from time-use surveys, the World Bank World Development Indicators, and an educational database maintained by Barro & Lee (2013). Health and environmental data for the rank-sum testing exercise were gathered from the World Health Organization and the Demographic and Health Surveys. Together, the results of the three studies in this dissertation provide a direction for future academic and policy developments that address issues of gender justice in a social-ecological manner.

1.3. Significance of Study

This dissertation addresses the integration of social, ecological, and economic dimensions of gender inequality in the Anthropocene. The elements of this study draw from the fields of economics, ecology, sociology, geography, and philosophy. By drawing from multiple fields, the methods used here are intended to complement one another, providing depth of perspective related to the issue of macroeconomic gender inequality.

Direct outcomes include recommendations for academic study, as well as international and national policy. I provide evidence here for the need to more fully address issues of justice in mainstream economics, and provide examples of ways to incorporate this through a social-ecological perspective. This perspective is also

recommended for the international policy scale, in order to branch out from traditional social, economic, and ecological metrics. I demonstrate the need for consideration of environmental metrics in health outcomes, particularly at the sub-national level. For national level policies to address gender inequality in the reproductive sector, I demonstrate the need for emphasis on equality in employment and unpaid work, suggesting educational and affirmative action programs to address these two areas of work at once.

1.4. Description of Chapters

In chapter 2, I explore the trajectory of economics that has led to a disconnection with collective notions of justice in the current neoclassical paradigm. The incorporation of feminist theory in other social sciences is considered in contrast, concluding that the detachment from collective forms of justice in mainstream economics is more pervasive compared with fields such as anthropology, geography, and psychology. This chapter is based on the characterization of the economic mainstream as focused on the maximization of individual wellbeing, which results in a lack of cohesion with other disciplines such as biology, psychology, and anthropology. This individualism also interjects a normative frame that challenges socio-ecological sustainability by prioritizing personal wealth over ecological and social prosperity.

In chapter 3, gender inequality is examined, in part, as a result of the unequal division of unpaid labor between men and women. Time-use studies reveal that the burden of non-market labor on women is twice that of men in developed regions, and approximately three-and-a-half times greater in developing regions (United Nations

Statistics Division, 2015b). This type of work includes services that allow for intergenerational reproduction of a population through care, socialization, and education, providing hidden subsidies to other (often market-valued) areas of the economy by contributing to labor productivity. Despite its importance and contribution to overall wellbeing as well as labor productivity, the unpaid work that makes up a large portion of this 'reproductive' sector is often overlooked in mainstream macroeconomics (Antonopoulos, 2008). Further, while feminist economists have made strong theoretical arguments about the positive effect of unpaid labor (and in particular, caring labor) on the economy as a whole, there is little empirical evidence that tests this hypothesis. This relationship is tested econometrically, estimating the macroeconomic impact of unpaid care work on employment and development in sixty-two countries. In particular, this includes evaluation of the effect of gender inequality in time spent in unpaid reproductive work as well as public spending on social reproduction on macroeconomic development. Results reveal a complex relationship between gender equality in the reproductive sector and development, including an interdependent relationship between gender inequality in paid and unpaid work.

Chapter 4 explores maternal mortality rates as a part of the international development agenda, including incorporation in the United Nations Millennium Development Goals (MDGs). Of the eight main goals, improving maternal health was the least achieved during the 1990 to 2015 commitment period. Renewed efforts to reduce maternal mortality through the Sustainable Development Goals signal a shift toward including environmental factors affecting women's health and sustainable

practices needed to address them. To investigate this comparative lack of progress and proposals to accelerate achievement, maternal health is first discussed as an international development goal, with particular focus on maternal mortality outcomes during the MDG period. Three traditional healthcare access metrics and two environmental metrics are then compared between MDG-targeted countries with above- and below-average maternal mortality rates. Results of these comparisons reveal that traditional healthcare metrics do not necessarily translate into lower maternal mortality rates, yet environmental metrics more closely align with these health outcomes. This result suggests that healthcare access alone will not solve deeply gendered health issues if underlying effects of poverty and environmental health are not addressed.

Through this dissertation, I will recommend steps toward replacing current mainstream economic structures with a more socio-ecologically equitable system. This shift involves mainstreaming feminist theory in economics and more broadly shifting economic paradigms away from the neoclassical treatment of justice, analyzing gender equality across various current macroeconomic structures, and understanding the impact of national programs and investments toward issues of social justice.

A concluding chapter summarizes the findings of the three studies, including policy recommendations and areas for future research. By contributing to the understanding of gender equity issues inherent in neoclassical economic systems, I offer recommendations at the academic, macroeconomic, and national program scale. Together, these improvements offer an agenda for a more just economic paradigm that may then be extended or integrated with other frameworks for improved economies,

including those focused on environmental rights and long-term sustainability. By reclaiming the underpinnings of justice and ethics that once governed classical economics, macroeconomic and governance structures may have the capacity to function more equitably.

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CHAPTER 2: LITERATURE REVIEW

2.1. The Current State of Economics and Justice

Neoclassical and neoliberal economics are often associated with growth, conspicuous consumption, and the novelties of innovation (see Jackson, 2009, for example)—qualities considered by some to be incongruous with environmental sustainability and wellbeing (see for example, Ayres, van den Berrgh, & Gowdy, 2001). The dominant form of economics today involves the circular movement of goods and services from firms to households and the movement of factors of production from households to firms (Costanza et al., 2009; Daly, 1996). In this system, globalization is hailed as an important and positive means for economic expansion. While a global economy and free trade are seen generally as progressive to human development, this expansion in the current economic framework follows an individualist perspective, in which an increase in total world production as a result of specialization and trade would leave some individuals better off, but not necessarily whole national or global populations (Daly, 1996). Critiques of neoclassical economics have focused on the distorted reality put forth by continual abstractions of society and environment, the focus on throughput as a main metric of success (e.g., Gross Domestic Product [GDP] and Gross National Product [GNP]), regardless of quality (see Costanza et al., 2009), and the "financialization of everyday life," that has come to be expected in the current economic paradigm (Pearson & Elson, 2015).

The injustice felt by systemically uneven gains in wealth calls into question the relationship between justice and economics. Although the origins of economics lie in

ethical and political studies (Alvey, 1999), mainstream neoclassical prioritization of individualism and unconstrained financial gain has become inhospitable to collective justice frameworks that promote societal wellbeing over individual gain. Multiple theories exist for the origins of neoclassical and neoliberal individualism, including deep mistrust of government, underlying concepts of natural right and reason in Roman law (emphasizing naturally occurring, rather than state-organized, relationships), and the rise of Protestant (particularly Calvinist) ideals (Barker & Carman, 2000; Bozeman, 2007; Robertson, 1935; Weber, 1930). Neoliberal political and economic agendas seen today are even thought to disrupt social justice through this promotion of individualism at the expense of society (Brodie, 2007).

One expression of injustice in the current neoclassical paradigm is through a lack of equity, following the International Labour Office's (ILO) definition of (gender) equity as "fairness of treatment… according to their respective needs and interests" (ILO, 2007, p. 92), and equality (groups having the same rights, responsibilities, and opportunities) due to status and/or discrimination. Equity can also be defined through assessment, such as whether a situation is inevitable or unfair, which stems from discussions of equity in health, pointing to determinants such as natural, biological variations as an inequality but not an inequity (Whitehead, 1992). Haughton (1999), writing from the field of urban development, conceptualizes inequity through five sub-categories existing in societies: intergenerational, intragenerational, geographical, procedural, and inter-species. These definitions, while potentially competing in measurement, are not mutually exclusive and are to some extent complementary in expressing equity and inequity.

In neoclassical economic thinking, social inequalities are seen in general as an economic 'bad', often with reference to an ideal of Pareto optimality, where an exchange between parties will result in at least one of those individuals gaining and neither losing (or in an economy as a whole, where no one in the population loses as others gain). However, inequalities can be ignored as externality, or even justified as tradeoffs of a free and fair market system in neoclassical economics (Wisman & Smith, 2011). The individualism in this economic approach assumes that collective justice and redistribution is non-optimal. Feminist scholars link this distancing from collective justice to deep male-biased roots, summarized in Pujol's (1992) six major elements continuing economics' resistance to collective justice perspectives: male domination in the neoclassical school of thought; the singular control of the field under the neoclassical paradigm; the narrow and exclusionary range of topics considered in the field; simplification of women's issues; methodological abstraction; and inherent androcentrism. Additionally, distancing from the laws of nature (jurisprudence), justice, and natural resources as a source of production, which were staples of the moral philosophy in economic thinking in the 18th and 19th century (Alvey, 1999; Christensen, 1989), have been linked with the transition to individual profit-driven ideals at the expense of collective justice. Unsustainable practices, like social inequalities, are blamed on market or government failures rather than institutional or paradigmatic shortcomings, and solutions to internalize environmentally harmful externalities are infrequently proposed (Söderbaum, 2008).

2.2. Heterodox Economic Approaches and Justice

The idea of linking ecological and social well-being stands in contrast to narratives of individualism, growth fetishism, and narrow definitions of progress that place ideals of modern capitalism and the political structures surrounding them above societal and environmental needs. Various heterodox fields of economics, as well as other social sciences, acknowledge that ecological, social, and economic linkages are crucial to addressing complex problems. While there is much debate among feminists about the connections between women and nature, for example, general consensus shows that important connections exist between the oppression of women and oppression of nature, which are embedded in a patriarchal conceptual framework and that understanding these connections is necessary to understanding the oppression of both women and nature (Warren, 1987). Furthermore, as women and children are disproportionately affected by environmental damage, environmental sustainability measures must take into account gender and generational justice (Shiva, 1993). Such thinking shows that in order to integrate social and environmental sustainability, thus broadening the notion of sustainability as a whole, it is crucial to recognize the linkages between these two realms, such as the relationship between gender and the environment.

These critiques of mainstream economics come from various standpoints of ecological and societal wellbeing, and have been conveyed through several heterodox fields of economics. Justice is addressed in these economic critiques as social inequities in the distribution of wealth and income, as the current economic paradigm fosters an expanding distance between the richest and the poorest, globally, as well as within

national boundaries (Benería, 2003). The expansion of notions of wellbeing and inequality in recent years has allowed for a deeper and broader look at the values under which societies operate, and in turn have led to the development of more holistic measures and focus beyond market economies to improve lives through integrated social and ecological protection.

One heterodox approach is feminist economics, which serves as a framework for calling attention to the inequalities inherent in mainstream economic thought, and as a way of thinking that moves beyond this paradigm. The feminist critique emerged in academia in the first half of the twentieth century as part of a broader women's rights movement, evolving from the "first wave" of feminism tied to suffragette movements of the 1880s (Offen, 1988) to the so-called fourth-wave and postmodern feminism of today. Central to the goals of feminist theory is multidimensionality and concern for inter- and intra-group disparities, which is used as a foundation for the appraisal of social justice issues in traditionally masculinized topics. Feminist economists, among others, have called into question the neoclassical economic fixation on financial and productive sector growth at the expense of social and ecological wellbeing (Pearson & Elson, 2015).

Feminist economics also departs from notions of monetary wealth as appropriate measures of wellbeing, indicating that an economy is far more complex than male-dominated neoclassical thinking suggests (Nelson, 2010b). By taking a more holistic look at an economy beyond the money moving through it, feminist economists show that goods and services produced by both market and non-market labor must be valued, that broader notions of wealth inequity (including wealth of opportunities and capabilities)

hinders the overall wellbeing of an economy, and that cooperative approaches to well-being trump neoclassical notions that rewards individualism and allow for the rise of an elite (generally male, Western, and white) class at the expense of the rest of the population. As in other economic sub-disciplines that reject the neoclassical notions of monetary wealth as a goal for individuals, feminist theory aligns more closely with economic activity that serves psychic income (such as the care economy), or the enjoyment gained from the goods and services (England & Folbre, 2003; Lawn, 2005).

Expanding away from a solely market-focused notion of economic valuation, feminist economists have highlighted the importance of non-market labor and goods in an economic system. This reproductive sector of the economy complements the financial and productive sectors that are generally the focus of neoclassical economics, encompassing services that allow for intergenerational reproduction of a population through care, socialization, and education (Pearson & Elson, 2015). The notion of a "caring economy" is key within this sector, including labor that has generally been relegated to women, taking care of children, the elderly, and infirmed (Folbre, 2001a).

Ecological economics provides another heterodox approach to incorporating social and environmental challenges in economic thought. This discipline takes another approach to justice, beginning with the assumption that physical ecosystem limits exist in the form of planetary bounds, complex environmental relationships, and thermodynamic laws, and that the economy is a subsystem within these limits (Daly, 1996). This idea of economy being embedding in a society that is in turn embedded within an ecological context is often referred to as a "nested systems" approach.

As with feminist economists, ecological economists have questioned the fixation on financial and productive sector growth in neoclassical economics, recommending increased attention to the ecological and reproductive sectors instead (Daly, 1996; Daly & Cobb, 1994; Jackson, 2009; Pearson & Elson, 2015). The correlation between human wellbeing and economic growth in neoclassical economics is critiqued by ecological economists through evidence that social wellbeing reaches a maximum threshold that is not reflected in GDP growth (Costanza et al., 2009; Stiglitz, Sen, & Fitoussi, 2010). Efficiency, seen in neoclassical economics as the maximization (or optimization) of outputs for the lowest cost, has trade-offs in terms of equitable distribution as well, described as "social efficiency" (Penz et al., 2011).

While ecological and feminist economics question similar facets of mainstream economics, theories of justice in these two fields differ, particularly through ecological economics' alignment with theories of justice posed by Rawls (1971). Feminist scholars, in contrast, tend to reject Rawls' theory of justice due to a lack of inclusion of distributional and societal barriers to equity that feminist economic justice hinges upon (Henderson, 1997; Matsuda, 1986; Pelletier, 2010; Young, 1990). In recent years, there has been some effort to move the ethics of ecological economics away from a purely Rawlsian approach to justice toward a communitarian normative position (Pelletier, 2010), suggesting opportunity for potential alignment of ecological and feminist economics in moving justice forward as an economic priority.

Future work on justice in economics may also benefit from the newer heterodox field of socio-ecological economics, which addresses political and sociological elements

in addition to the biophysical realm of ecological economics. This field takes the stance that economics has not taken equity and social concerns seriously, and that this is ultimately a social choice problem concerning limits (Spash & Kerschner, 2014). The alignment of feminist, ecological, socio-ecological, and other emerging perspectives in economics offers increased opportunity to question mainstream approaches to justice and the methods and metrics used to analyze social, ecological, and economic success.

These various heterodox economic fields often rely on multidimensional indicators to measure the overlap between social and ecological concerns. This multidimensionality is often illustrated in the concept of sustainability as a three-legged stool held up by economic, social, and environmental supports. If one of these legs becomes weak and breaks, the rest of the stool collapses as well. While many measures exist to assess ecological resources and human use of these, there is continued debate over how to effectively combine ecological and social metrics.

One concern of combining environmental and social indicators surrounds the treatment of non-market components in a market system. In the case of the Index of Sustainable Economic Welfare (ISEW) and the Genuine Progress Indicator (GPI), composite measures stemming from ecological economics, for example, the monetization of environmental factors in social sustainability indicators has been controversial from its inception, yet the monetization of social indicators has also become a divisive area in this measure (see Beça & Santos, 2010). This union of concern has offered a starting point for a discussion of how to compare indicators and indices of variables that are measured in very different ways.

Another concern in the measurement of deeply linked social and ecological indicators is that while some indicators attempt to bridge the gap between environmental and social sustainability, many seemingly holistic indicators ignore one aspect or the other. Neumayer (2004) points out that well-being indicators, including the Human Development Indicator (HDI) popularized by the United Nations, usually ignore (environmental) sustainability, while sustainability indicators usually ignore social well-being, such as with Genuine Savings. In those indicators that do attempt to bridge the gap, such as the ISEW and GPI, there is often debate over the assumptions and comparability of indicators due to assumptions of the substitutability of human-made and natural capital through weak versus strong sustainability (Mayer, 2008; Neumayer, 2004). In a survey of eleven sustainability indicators, Böhringer & Jochem, (2006) found that many of these indicators fell short in their scientific underpinnings and were not easily comparable due to lack of standardized weighting, and that the holistic nature of sustainability was not reflected in the indices' variables. Of the eleven review indices, only the Living Planet Index (measuring trends in vertebrate species by taking the mean of biodiversity indices) complied with the scientific aggregation rule used by the authors as a foundation test. Many environmental sustainability indices and indicators include a human component, but do not assess human wellbeing, such as the Environmental Sustainability Index, which calculates the likelihood that a country will be able to preserve environmental resources effectively over several decades (Böhringer & Jochem, 2006). While ecological economists work to reject the environmentalist concept of "internalizing the externalities" to promote preservation in favor of more holistically

appealing to social aspects of sustainability (see Daly, 1996), the measurement of these aspects can prove difficult using existing techniques.

Beyond indicator measurements, methodological links between social and environmental measures include overlap in their concern for underlying processes that shape outcomes. This is seen in the study of biological and cultural differences between men and women in social sciences, and the study of environmental changes based on natural processes and human exploitation of resources. Much of the debate over how to integrate these concepts lies in the definition of sustainability adopted by practitioners and policymakers. Mayer (2008) defines sustainability as resilience of dynamic regimes and alternative stable states and the desirability of regimes to humans, suggesting an inherent link between humans and the environment. The Bruntland report, too, famously put forth the concept of sustainability through a combination of ecological, economic, social, and institutional support (Littig & Grießler, 2005). Adopting this view of interconnectedness, it is clear that the sustainability practices of these two realms must also be linked.

The recommendations from both environmental and social researchers to use complementary indices to measure the complex issue of sustainability indicates that a key way to link these fields is by using both environmental and social sustainability measures in tandem, taking care to maintain the integrity of the pieces involved. While some indicators have attempted this, such as the Well-Being Assessment, these have not held strong scientific foundations (Böhringer & Jochem, 2006). Future indicators must build

from a strong base that addresses the complexities of social and environmental aspects, as well as the ways that these affect one another.

2.3. Economic Gender Inequalities

Gender injustice offers one example of mainstream economics' failure to support just societal needs. Inequalities such as female seclusion, female genital mutilation, and domestic violence are not the result of market activity, but rather are socially constructed and often related to biological gender differences (Klasen, 2004). It is also suggested that this complexity of gender issues is lost in the aggregation of economic issues to a macro-scale (Benería, 2003). Because populations as a whole are not treated equally even when they have the same amount of economic wealth, it is important to understand intergroup dynamics and inherent social biases affecting equality. Klasen (2004, 2006), uses the example of "missing females" and sex-selective abortions, common in parts of Asia, to illustrate how measures of equity in health overlook a serious gender inequity issue by looking at living population statistics but not taking into account how that population has been shaped. Differences in equity related to skills and mobility are particularly important as extreme weather events and climate change occur, illustrated by increased vulnerability to floods for women due to issues such as stigma of being alone in public, lower likelihoods of swimming skills, and uneven responsibility for children (Cannon, 2002).

By expanding beyond the notion of equality existing only among currently living humans toward concern for the rights of future generations and non-human species, intergroup equality becomes an issue of sustainability as well as wellbeing. Beyond

looking at intergroup inequities, many feminists also argue that intragroup inequities must be accounted for. In the case of gender inequities, it is clear that there are vast inequities among women, not just when compared with men. The importance of understanding that not all women's experiences are the same came as a critique of second-wave feminism, which was seen by developing-world feminists as a Western-centric approach to women's issues (McDowell & Sharp, 1999).

Dualisms of gender and the privileges afforded to masculinity have also been identified as problematic to the adoption of collective justice in mainstream economic thought (Nelson, 1992). These false dichotomies that exist within economics and many other fields include notions of male versus female, selfish versus altruistic, and family versus market (England & Folbre, 2003). These intergroup inequalities, referring to differences in the opportunities and outcomes available to different groups (see Berik, van der Meulen Rodgers, & Seguino, 2009), are seen to decrease social mobility and wellbeing related to the growth of capabilities (Berik et al., 2009) and access to critical resources (Shiva, 1993). In feminist literature, such inequalities are often discussed in terms of the differences in opportunities and capabilities between genders that are shaped by society.

Due to the broad extent of both inter-group and intra-group gender inequalities that exist, many social, economic, and environmental domains of gender inequality must be taken into account. Race, gender, and class have been identified as interacting sources of inequality resulting in interpersonal, intrapersonal, and structural factors that affect behavior such as time use (Shinew et al., 2006). Gendered access to resources, various

power dimensions, and self-determination are all major areas of concern for equality, and can be shaped by biological and cultural dimensions. In cases of hardship, such as that caused by armed conflict, gender relations can rapidly shift, disrupting relative (in)equality for better or worse (UNEP, UN Women, PBSO, & UNDP, 2013). A key issue of gender equality is that it is not unidirectional or static, as either gender can be oppressed and social norms fluctuate. Gender inequalities also exist in many forms, and are not always the result of oppression. An example of the complexities that result in gender inequality is average lifespan, which is affected by both biology and behavior, and is generally biologically shorter for men than women, but is also subject to systemic gender inequities such as sex-selective abortion, which normally affects female populations (Klasen, 2006).

In economic systems, gender inequalities are often the result of discrimination, including gender norms that affect women's access and responsibility for paid and unpaid work. Differences between men's and women's constraints are abundant, seen in the "felt constraints" to leisure more common for women, related to an ethic of care (Harrington, Dawson, & Bolla, 1992). Studies of unpaid care work, for instance, show women in both developed and developing countries spending more time than men on household tasks and care for dependents (see, for example, Razavi, 2007). Women also bear the bulk of the costs associated with reproductive care (including financial, social, and opportunity costs), despite the benefits of this work for society as a whole (Razavi, 2007). This inequality is exacerbated in times of financial crisis, when austerity and structural adjustment measures targeting public service programs disproportionately affect those

that contribute to reproductive activities (Çağatay, 1998; Pearson & Elson, 2015). Feminist economists have worked for decades to place due value on unpaid labor by expanding away from a solely market-focused notion of economic valuation, especially highlighting the importance of non-market labor and goods in an economic system. Beyond wealth inequalities, differences in access to capabilities, resources and opportunities, and empowerment are seen as dimensions for understanding relative gender inequalities (Seguino, 2007, 2013a).

The need for economic inclusion of the costs of maintaining and reproducing the labor force has long been acknowledged (Çağatay, 1998), yet this sector remains largely invisible in economic analysis and policymaking. While gender disaggregation studies of economies have worked to quantify inequalities in macroeconomic systems, important gendered elements of the labor force are overlooked as attempts to isolate the reproductive sector and understand feedbacks between the productive and reproductive sectors are not included (Çağatay, Elson, & Grown, 1995; Nallari & Griffith, 2011). However, Folbre (2006) proposes measuring the care economy in terms of "time accounts", which can be based on time-use surveys that take an in-depth look at the ways that people spend time, often through personal diaries over the course of one or multiple days.

Gender equality in education and employment have been targeted by policy initiatives at the international level, such as through Millennium Development Goal 3: Promote Gender Equality and Empower Women, which included evaluation of indicators related to the ratio of girls to boys in various levels of education, the ratio of literacy in

women and men, shares of women in non-agricultural wage employment, and the proportion of women in national parliamentary seats (UN Millennium Project, 2006). In addition to education and employment opportunities, an important factor for gender equity is health. Health can be considered as a piece of the reproductive sector, as it promotes societal wellbeing. However, gendered inequalities in health care access exist in many parts of the world. In addition to financial and political barriers to improving healthcare, socioeconomic and cultural factors shape women's health outcomes, such as influencing whether women decide to seek care when facing health complications related to pregnancy and childbirth (Thaddeus & Maine, 1994). Improvements to women's health are seen to significantly reduce poverty and increase the public health of whole populations.

In order to overcome gendered issues, it is important that policies target their roots. This need has been somewhat realized for decades, such as in initiatives that target poverty or education as underlying influences on gender equality. However, it is important to dig further in order to shape policies in a way that acknowledges and addresses the social and ecological realities that bound them.

2.4. Gender, Justice, and the Anthropocene

Scientists have declared the current geological epoch the Anthropocene, referring to the human impacts on geological processes that have not existed previously. While debate continues over the onset of the Anthropocene (see for example, Brown et al., 2013; Lewis & Maslin, 2015; Smith & Zeder, 2013; Steffen et al., 2011), it is clear that social inequalities have emerged as a deeply embedded piece of the negative human

influences on the planet. Such inequalities occur at various scales, including through disconnection between populations and individuals who create negative environmental impacts through the over-use of resources and those who suffer from these actions (Barnett, 2006; Ciplet et al., 2013). Additionally, as resource scarcity increases, countries that are the greatest offenders in past environmental degradation have taken stances against increases in resource use in developing areas without substantial commitments in their own regions (Okereke & Coventry, 2016). Coupled with histories of colonialism, racism, gender inequality, and many other factors of injustice, these political moves clearly play a strategic role in perpetuating oppression.

The major theoretical overlap between environmental and social measures of sustainability focuses on rights and justice, with the understanding of rights as fundamental tenets ensuring basic human wellbeing that play out in a sphere of justice (for further discussions of social justice and rights, see Harvey, [1973] 2010). Social justice includes an emphasis on individual freedoms and civil liberties, the opportunity to pursue wellbeing, distributive justice, and respect of others' freedoms (Merrett, 2004). Environmental justice emphasizes contribution to global aims of sustainable development as both a process and an end result, including potentially anthropocentric notions of sustainability requiring provision of natural resources for future (human) generations (Haughton, 1999). Concepts that are central to both of these definitions include human equity in resource access and a desire for holistic wellbeing beyond the individual.

Social sustainability assumes that human needs cannot be sufficiently met by stable and healthy environments alone, but that equally legitimate social and cultural

needs must be addressed too (Littig & Grießler, 2005). This concept echoes the need for analysis of social, economic, and environmental dimensions together. Importantly, criticisms of widely held theories of justice posed by feminist scholars and other social scientists also apply to environmental justice in many ways. For example, feminist economists' rejection of Rawls' theory of justice as an abstraction from reality (see Matsuda, 1986) reflects a major concern of ecological economics that abstraction has allowed for the development of an economic system that has no basis in ecological reality (Daly, 1996).

2.5. Conclusion

Economics, resource scarcity, and climate change are deeply gendered issues. By exploring the social contexts that motivated the adoption of the feminist perspective in the various social sciences, we can better understand the shortcomings of the field of economics in reconciling social justice issues in a way that can move toward a just and sustainable future. While mainstream economics once held roots in moral concern and human wellbeing, this concern has since been replaced with an abstract view of the world that is more accurately categorized as a branch of mathematics than a social science, unconcerned with the actors it portrays. This disconnect from justice is less pervasive in other social science fields due in part to interdisciplinary concerns, connections to the natural sciences, and deep time perspectives, all of which have become detached from mainstream economics.

As policies are developed to address the needs of the Anthropocene, social and ecological needs must be prioritized over mainstream neoclassical economic goals of

individualism, efficiency, and financial growth. If reforms are to adequately address the need for greater incorporation of justice in economics, it is crucial that topics such as environmental resilience are included. These issues are addressed in the following chapters through the exploration of gender equality as both a social and ecological issue.

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CHAPTER 3: RE-COLLECTING JUSTICE: FEMINIST PERSPECTIVES FOR A MORE INCLUSIVE ECONOMIC MAINSTREAM

3.1. Abstract

The discipline of economics is often characterized as focusing on the maximization of individual wellbeing, a narrow conception of human motives that lacks coherence with other disciplines such as biology, psychology, and anthropology. Individualism also interjects a normative frame that challenges socio-ecological sustainability by prioritizing personal wealth over ecological and social prosperity. Feminist perspectives and related justice frameworks offer a foundation for appraisal of the human condition that bridges social and ecological issues across the social sciences, yet the field of economics has been relatively resistant in adopting these critiques. This paper explores the trajectory of economics that has led to a disconnection with collective notions of justice in the current neoclassical paradigm. The incorporation of feminist theory in other social sciences is considered in contrast, concluding that the detachment from collective forms of justice in mainstream economics is more pervasive compared with fields such as anthropology, geography, and psychology.

3.2. Introduction

> "Economics, as a human endeavor, reflects human limitations in understanding a reality that is always just beyond our grasp. Economics, as a social endeavor, reflects some points of view, favored by the group that makes the rules for the discipline, and neglects others." – Julie A. Nelson (1992, p. 107)

When feminist perspectives emerged with the social movements of abolitionists and suffragettes in the late 19th and early 20th centuries, the founders sought to disrupt systems of oppression. The "first wave" of modern feminism began in France in the 1880s (Offen, 1988), and was inspired in the U.S. in part by the mobilization of women in antislavery campaigns (Marilley, 1996). Changes in women's traditional roles due to industrialization, increased access to education, and broader participation of women in the public sphere played significant roles in establishing the cultural context for the emergence of feminism's first wave (Buechler, 1990).

While the feminist movement gained momentum in political arenas and made some headway in furthering women's education in the sciences, it was not until the mid-20th century that academia took a critical stance on treatments of sex and gender (Crasnow *et al.*, 2015). By this time, women's involvement in higher education was still seen as eccentric and novel, especially in scientific fields (Bix, 2004). As feminist theory was formalized in universities, early feminist academics were seen as "compilers," archiving women's historic contributions regardless of quality—a role since criticized for both a middle-class and nativist bias, as well as a singular narrative of victims working against their oppressors (Lerner, 1969). These early attempts to incorporate feminist perspectives, in retrospect, seem disjointed and accommodating of the status quo, and have even been accused of perpetuating 19th century gender divisions (Rosaldo, 1980).

When feminist perspectives finally entered the social sciences more broadly in the 1960s and 70s, this again coincided with social movements such as campaigns for civil rights, reproductive freedom, and environmentalism, inspired in a similar manner to the

abolitionist and suffrage movements of the 19th century. In connecting social justice with broader global movements and perspectives, the institutionalization of feminist perspectives supported (and was supported by) an interconnected understanding of seemingly disparate movements and fields. This form of systems thinking was accompanied by an emphasis on unequal power relations and the recognition of societal needs beyond those of individuals. With the rise of intersectional gendered perspectives such as racial and indigenous views, feminist theory has become largely focused on achieving collective forms of justice that favor social, economic, and cultural rights over more individualistic civil or political priorities (Collins *et al.*, 2010).

Social science disciplines that saw early adoption of feminist perspectives, such as anthropology, were due to a concern with human biology, a deep time perspective, and reflexive and interdisciplinary scope (Cook, 1983; Stacey and Thorne 1985; Crasnow, 2006; Rupp, 2006). Geography, too, has mainstreamed feminist perspectives through its integration of gendered issues with other major categories of geographical research and concerns for the physical and social composition of the earth as space and place (Johnson, 2012). Psychology, though still working to mainstream the feminist perspective, has also been careful to highlight the complexities of biological and cultural imperatives in human interactions with each other and our environments (Clayton and Myers, 2015).

In economics, however, we see continued resistance to feminist principles and other justice frameworks in an attempt to perpetuate a narrow view of self-interest in "Homo economicus". Any concerns for justice in neoclassical economics focus largely

on the individual's right to choose rather than broader social concerns or interest in unequal power dynamics. The near singular goal of market efficiency in most mainstream treatments of economics accepts the distribution of power, wealth, and income as a given, with little attention to issues of discrimination or injustice in market relations (Pujol, 1992). While many in the field consider it to be the most scientific of the social sciences (Colander and Klamer, 1987), there is much concern for the moral compass of economics.

Understanding the disconnect between collective and individualistic notions of justice is especially important as economics has become the most dominant social science, not only from the perspectives of economists themselves, but also from the institutions they serve (Lazear, 1999; Fourcade *et al.*, 2015). Other social sciences, though influential in academia, lack the political power of economics. For example, Abbott (1997, p. 1150) laments sociology's "replacement as a policy advisor to governments, a role that has been almost completely assumed by economics," and further admits, "we may belittle economists within the security of our meetings, but they alone have the ear of the prince."

We propose that the absence of collective justice as a policy objective in neoclassical economics, and the field's resistance to justice-based frameworks such as feminist theory, are rooted in the field's historical trajectory toward insularity, abstraction, and individualism. While economics was once rooted in moral philosophy and societal wellbeing, this concern has since been replaced with an abstract view of the world that simplifies the needs and concerns of the actors it portrays. In this paper, we

first explore how the individualistic notion of justice and lack of concern with power dynamics in neoclassical economics have resulted in limited treatments of social equity and environmental protection. The integration of collective justice via feminist theory in the fields of anthropology, psychology, and geography is then observed as an example of various forms of adoption in the social sciences. Economics is then discussed as a late adopter of the feminist critique, including a closer look at how collective justice frameworks have existed at the margins of economics through sub-fields such as feminist economics, social economics, and ecological economics. We conclude by proposing that mainstream notions of justice in neoclassical economics are detrimental to approaching socio-ecological goals necessary for a sustainable economic system, and recommend steps toward a more collective framework.

3.3. The Distancing of Justice and Economics

The origins of economics as a discipline are found in the extension of ethical and political studies from the works of Aristotle through 18th century teachings in European universities (Alvey, 1999). Laws of nature (jurisprudence) and justice featured heavily in economic thinking of the 18th and 19th century, focusing largely on natural resources as a source of production that operated under the umbrella of moral philosophy (Christensen, 1989; Alvey, 1999). Classical economists such as David Ricardo saw the concentration of wealth among an elite class as a disadvantage for the economy as a whole, casting a stark contrast to the individualistic capitalist notions of today that hold personal gain above group wellbeing (Fusfeld, 1990). John Stuart Mill also saw economics as a means to human happiness, adding a moral compass to his vision of the economy (Alvey, 1999).

And physiocrats such as François Quesnay believed strongly in the "supremacy of natural law" and the dependence of economic growth on crop production, advocating for distributive justice through the taxation of landowners rather than from farmers, as landowners' lifestyles and lack of land production were seen as hindrances to economic welfare (Fusfeld, 1990).

In fact, Adam Smith, considered the founder of modern economics, taught economics as one piece of moral philosophy tied with natural theology, ethics, jurisprudence, and politics (Ross, 1995). Despite his earlier teaching of economics as moral philosophy, Smith's *Wealth of Nations* is considered by many to be the breaking point between economics and its moral philosophical roots (Alvey, 1999). This break, however, did not signal the end of ethics in economic thinking—rather, Smith speaks at length about the value of commutative justice, prudence, and benevolence (Alvey, 1999). Despite interest in justice, this was largely limited to a frame of individualism, which Smith and his contemporary, Edmund Burke, are credited with promoting (Hayek, 1948).

Although classical economists preceded much of what today is seen as a feminist perspective to justice, some could be considered progressive in their conceptions of social equality. While discussions of gender by Adam Smith focused mainly on women's reproductive importance, John Stuart Mill considered private property inherently unjust, calling for equality between genders in terms of ownership, power, and privilege despite his traditional views on sex roles (Pujol, 1992). Harriet Taylor, contemporary and partner of Mill, could similarly be considered an early feminist, though (along with Mill) inconsistently promoted patriarchal and individualist notions of capitalism and liberalized

economies by attributing injustices to outside forces such as inheritance laws and cultural norms of chivalry (Pujol, 1992).

Despite the potentially collectivist leanings of some classical economists, a methodological break from moral philosophy occurred during the dawn of the neoclassical era of economics through the adoption of mathematical modeling in the 19th century, the beginning of economics as an isolated social science (Alvey, 1999). Early neoclassical economists such as William Stanley Jevons worked to align their field tightly with mathematics (Schabas, 1990), shifting the discipline toward a goal of scientific rigor and positivism. This break from moral roots allowed the field to isolate itself from the rich understanding of the contexts that economic models aim to express (Nelson, 2013).

Positivist views of economics, rejecting subjectivity and preference, have also been seen as a departure from the field's roots in moral philosophy (Alvey, 1999). While notable economists including Milton Friedman have associated this turn with objectivity and scientific legitimacy in economics, it has been seen as a major hindrance to the integration of justice and moral frameworks (Stacey and Thorne, 1985; Alvey, 1999). Central to critiques of positivism is the lack of space for multiple voices, particularly those that have been historically marginalized (Dantley, 2002). By rejecting diversity and overlooking power dynamics, positivism contributed to the narrowing of economics toward an individualistic and privileged notion of justice.

This narrowing also resulted in a distancing from the understanding of physical restraints applying to the accumulation of capital. Alfred Marshall, for example,

considered natural resources as special factors of production in contrast to "the classical predisposition to regard land as not producible… largely the result of thinking in physical rather than economic terms" (Blaug, 1997, p. 81). As the neoclassical production function broke from the physical aspects of land, practical requirements of distribution for supporting human life were also set aside. The analogous treatment of land and capital in neoclassical economic thinking has proven a major issue in expressing the realities of production as transformation of energy and matter (Christensen, 1989).

Reductionism to exchange value (over energy, land or labor theories of value) separated the field from contemporary understandings of social and environmental realities (Nelson, 2003). Wilson (1998, p. 214) describes the two major problems of this economic reductionism as:

> "Newtonian, because economic theorists aspire to find simple, general laws that cover all possible economic arrangements. Universality is a logical and worthy goal, except that the innate traits of human behavior ensure that only a minute set of such arrangements is probable or even possible. ... The models also fall short because they are hermetic—that is, sealed off from the complexities of human behavior and the constraints imposed by the environment. As a result, economic theorists, despite the undoubted genius of many, have enjoyed few successes in predicting the economic future, and they have suffered many embarrassing failures."

As a result of this historic trajectory, neoclassical economics is now taught and practiced with the prioritization of individualism over the field's social and ecological roots. The abstraction of economic systems has stripped away the realities necessary to

account for issues of discrimination or power dynamics, leading to the "perfect fiction" of contemporary neoclassical thinking (Pujol, 1992, p. 6). As summarized by Mirakhor (2014, p. 187), "Economics, it seems, flattens consciousness in all its dimensions except one: that of an egoist." As individual utility is prioritized over group utility, income redistribution and market efficiency are at odds (Hodgson, 2000). In recent years, this prioritization of individual gain and market efficiency has been accused of rejecting compassion and empathy in favor of hedonism and outdated notions of rationality (Brown, 2015).

Through this move toward individualism and unconstrained financial gain, neoclassical economics has become inhospitable to collective justice frameworks. In particular, the neoliberal political and economic agendas seen today are thought to disrupt social justice, particularly through the promotion of individualism at the expense of society (Brodie, 2007). Feminist scholars have tied this distancing from collective justice to deep male-biased roots, linking mainstream neoclassical thinking to the dualisms of gender and the privileges afforded to masculinity (Nelson, 1992). Pujol (1992) identified six major elements contributing to economics' continued resistance to the collective justice of feminist perspectives: male domination in the neoclassical school of thought; the singular control of the field under the neoclassical paradigm; the narrow and exclusionary range of topics considered in the field; simplification of women's issues; methodological abstraction; and inherent androcentrism.

Today, the unevenly male influence on economic systems and theory appears throughout academia. Fewer than one-third of economic doctoral degrees are awarded to

women, while sociology and life sciences have become far more gender balanced (Fourcade *et al.*, 2015). By 2014 only 15.4% of tenured and tenure-track faculty in 124 Ph.D.-granting economic departments in the U.S. were women (McElroy, 2015). The consequences of a male-dominated field included favoring types of wellbeing preferred by men over women (Bonke *et al*., 2007). In addition, gender is often reduced to a binary variable in economic analyses, missing historical developments leading to the gendered divisions in systems such as labor markets today (Figart, 2005). Content analyses of economic journal articles, analyzed 25 years apart, both found that article authors were more likely to cite studies by those of their own gender, with men tending to cite men and women citing women (Ferber, 1986; Ferber and Brün, 2011). This bias, while arguably not just for either gender, results in a disadvantage to women in the male-dominated field of economics.

In summary, Rich and Burress (1997) find that the neoclassical pillars of "one dollar, one vote," and the regard of each dollar as equally valued by all people, are inherently ignorant of human welfare and inequity, even when considering individualistic goals. While collective approaches to justice have had success in other social science fields, feminist theorists and equity perspectives have met decades of resistance in neoclassical economics. Economics' unique resistance to collective justice frameworks is seen as rooted in the field's insularity, individualism, and abstraction from the major collective issues of biophysical earth systems, including widespread poverty, climate change, and energy depletion. In order to better understand the relationship between

economics and the collective justice of feminist theory, we next consider how justice and feminist principles are integrated in other social sciences.

3.4. Integration of a Feminist Justice Framework in the Social Sciences

As a form of collective justice, feminist perspectives have come to be associated with addressing power relations, promoting the visibility of the care economy, and overcoming androcentric assumptions about how society operates. Despite these uniting characteristics, feminist theory and its applications are deeply nuanced. Rather than simply providing a female perspective on traditionally male-dominated academic fields, feminist perspectives offer a separate voice (complete with separate biases, goals, and worldviews) for framing research. The intersectional nature of feminist theory has provided space for overlap with inequalities resulting from other forms of discrimination, such as those based on class and race. Though at times criticized for creating a generational divide that buries a nuanced evolution of thinking among feminist scholars (Gillis and Munford, 2004), the popular "waves" analogy of the development of feminist theory is used here to outline a brief history of this movement.

The feminist critique emerged in academia in the first half of the twentieth century as part of a broader women's rights movement. The "first wave" of feminism took place around the same time as the emergence of neoclassical economics. While first-wave feminism operated within the social context of striving for equal rights, second-wave feminism in social sciences, rising in the 1970s, focused on critiquing underlying issues of inequality rather than analyzing their outcomes. Momentum in feminist thinking once again coincided with social movements of collective action. It was during this

second movement that feminist perspectives spread through academia, especially through reflection on the influence of women's previously overlooked roles in various fields (Lerner, 1969). McIntosh (1983) and Stacey and Thorne (1985) characterize the shift in feminist theory in academia as first "filling in gaps" to present a feminist perspective and highlight inherent biases, leading to a point that then requires shifting the underlying paradigms that created gendered gaps in the first place. While more normative fields saw success in the adoption of feminist principles, disciplines oriented around positivist goals such as economics were slow to adopt (Stacey and Thorne, 1985; Benería, 1995).

Since the 1990s, first- and second-wave feminism have been largely dismissed as outdated due to a lack of concern for the varied experiences of women shaped by social and economic contexts. Post-Reagan and post-Thatcher movements highlighted intergroup inequalities with interest in understanding the role of the state in providing for its people as a group, rather than individuals providing for themselves. Third-wave feminism is sometimes seen as a rejection of earlier movements, and other times as a step forward, adding to their conversations. This split is seen through both the respect for the movement's roots and the reconsideration of feminism and its past principles and leaders (Mann and Huffman, 2005). For example, Simone de Beauvoir, once a figure of women's empowerment, has been critiqued in the third wave for negatively portraying femininity (Deutscher, 1997). This generation of the feminist movement has also been identified as "distinctively American," and somewhat anti-foundationalist (Snyder, 2008).

Third-wave feminism and so-called fourth-wave or postmodern feminism, have focused on the differences within gender groups rather than only between genders.

Elements of intersectionality theory, postmodernism, poststructuralism, postcolonial theory, and Marxist feminism have all played significant roles in the movements beyond the second-wave (Mann and Huffman, 2005). Multidimensionality has become central to these studies, especially concerning the complexity of interacting effects of gender with other forms of inequality. Intra-group disparities, such as the differences in women's wellbeing based on factors including race, sexuality, and social class, show the uniqueness of individual experience and highlight the shared experience of inequity.

3.4.1. Feminist Perspectives in the Social Sciences

Feminist perspectives have emerged in diverse ways throughout the social sciences, and with differing levels of success. One description of this evolution in adoption of was proposed by McIntosh (1983), who characterized five phases of curricular revision from an exclusionary framework toward the full inclusion of women's experiences. First, a "womanless" phase focuses on the perspectives of privileged white males as universal, ignoring other groups. Secondly, famous women are acknowledged. Next, women are included in analyses as problematic under existing paradigms. Then, in a "women as history" phase, concern for diverse and unique perspectives of women is considered. Finally, a restructured paradigm emerges that rejects hierarchical thinking. These phases touch on different forms of concern for justice, but with a common thread of concern for deep social injustices, rather than those that are personal or isolated.

McIntosh's timeline, however, does not address the type of catalyst needed to start the steps to incorporate collective justice in traditionally individualistic fields or topics. Even if practitioners are acutely aware of the need for an unheard perspective,

they may be at a loss for addressing such a problem if the paradigm they face is inherently unjust or incompatible with systemic thinking. For example, as Wylie (1992) notes in describing the need to integrate personal experience with its context in feminist research, "The crucial task will be to give an account of criticism that differentiates the forms necessary for feminist inquiry—forms that are constructive, respectful of and responsive to women's experience—from the oppressive and destructive forms all too common in dominant disciplinary traditions of research."

The emergence and evolution of feminist theory in four social sciences is surveyed here in order to explore catalysts for change in incorporating a form of collective justice in academic fields. Anthropology is explored as a relative success story with broad inclusion of women's voices and perspectives across the field; geography is seen as an area where feminist notions were once viewed as radical, but are now a mainstay for the field; and psychology reveals an ongoing struggle in accepting feminist voices, but with a promising basis for shifting mainstream thinking. The examples set by these three fields are reviewed in contrast to the field of economics, where the neoclassical paradigm has proved more resistant to feminist thought.

3.4.1.1. Anthropology

Feminist anthropology has worked in part to correct androcentric biases in ethnographic and archaeological research (Cook, 1983; Crasnow *et al.,* 2015). Although women have a deep and respected history as researchers in anthropology (Rupp, 2006), male biases still persisted as feminist ideas spread through the field. In working to correct

these biases, anthropology has become known as a relative success story among the social sciences in mainstreaming feminist principles.

Stacey and Thorne (1985) attribute the success of feminist anthropology in part to the centrality of kinship (a biological aspect) in the construction of gender, and to the interpretive (rather than positivist) nature of the field. Fertility, for example, is a gendered biological process that cannot be fully understood without the consideration of social reproductive factors concerning marriage, family planning, and infant treatment (Greenhalgh, 1995). Anthropology has long tied social and physical sciences, relying upon biology and natural earth processes to explain human evolution and behavioral patterns. Greenhalgh (1995, p. 12) describes the multidimensional nature of anthropology as follows: "The hallmark of anthropology is its holism, its attempt to achieve broad, multi-angled understandings of the phenomena of interest."

Anatomical and archaeological research have also opened anthropology to a very broad time horizon, allowing for the analysis of changes in men's and women's lives throughout pre-history and in relation to their environment (Cook, 1983). Hodder and Hutson (2003, p. 72) find that the "functional use and environmental features are parts of the process of giving meaning to the world." The feminist perspective has become a driving force in post-processual archaeology, particularly in studies of sexual divisions of labor and other activities (Hodder and Hutson, 2003). Though feminist perspectives are now considered an important piece of archaeological interpretation, Hodder and Hutson (2003) suggest that this sub-field's connections to positivism may have slowed the feminist critique in archaeology more so than in interpretive areas of anthropology.

Archaeologists' understanding of the economy frequently highlights a shift in resource management and lifestyle occurring with the shift from hunter-gatherer to agricultural societies. This shift in the exploitation of nature highlights both humans' reliance upon the earth's resources and the ways that the availability of these resources can shape culture.

Fields with more interpretive approaches, such as anthropology, are seen as more conducive to feminist approaches in general (Stacey and Thorne, 1985). The reflexivity related to interpretive methods and interdisciplinary research in the field of anthropology has led to a more diverse knowledge base and the ability to bridge gaps in understanding gender relations. In fact, early versions of feminist anthropology sought to rewrite the field's male biases to be more accurate and inclusive in ethnographic and archaeological studies (Cook, 1983; Crasnow, 2006). By focusing in this way, the self-awareness in the field allowed flexibility, reflection, and correction of past mistakes.

3.4.1.2. Geography

The field of geography has also been successful in expanding into a multidimensional view of women's (and men's) experiences (McDowell, 1992). As Johnson (2012, p. 349) describes, "Geography now takes seriously women's spaces and concerns and conducts research with an awareness of gender while absorbing into its core ongoing developments in feminist theorising." This "cultural turn" in the field of human geography is attributed largely to the influences of feminist and post-structuralist views (Clifford *et al.*, 2010). As in anthropology, feminism grew in this field through criticism of positivist methodologies (Clifford *et al.*, 2010).

Geography, long understood as a field of "human ecology" (Barrows, 1923), explicitly focuses on the relationships between humans and their environment. Like anthropology's connection to the natural world via its sub-field of archaeology, the field of geography contains both social and natural sciences. Human geography can thus be grounded in physical geography, as human subjects operate within distinct spatial limits. These two geographical sub-disciplines have long been complementary to one another, explaining human relationships with and impacts on the earth's natural functions (Pitman, 2005).

In holding the tenet that humans are influenced by their environment and vice versa, geographers have integrated justice and science through an understanding of the need for distribution of resources and support of rights to maintain social and ecological wellbeing. Feminist geographers such as Rose (2010) express concern for neoliberal philosophy, showing that this school of thought is incongruous with the concept of social protection and rejects institutional influences on poverty and equity. Explorations of women's relationships with the space in which they live have also been central to the development of feminist geography (Listerborn, 2002; Bondi and Rose, 2003). By exploring these relationships between humans and environment, geographers have incorporated feminist perspectives into the concurrent consideration of ecological and justice issues.

3.4.1.3. Psychology

The field of psychology, like anthropology, considers complementary social and biological processes to explain one another. However, ties with biology have in this case

led to a dichotomy of science versus practice, in which connections to science are defended by the field due to a desire for legitimacy (Marecek, 2001). In this sense, the discipline of psychology seeks legitimacy through incorporation of the biology's positivist methods, which undermines its ability to incorporate social justice.

Morawski (1994) describes the hurdle of scientific empiricism as a focus of feminist psychologists redefining scientific norms in the field to overcome historical biases. This type of research has taken three paths: critical analysis of male biases in research; sex and gender disparities with regard to the role of environment and historic research biases; and the inclusion of women's experiences (Morawski, 1994). Morawski's work shows concern for psychology's reliance upon scientific principles as unchanging and set, while in truth the scientific norms of her field that are considered objective carry the subjectivity of generations of male bias.

Mainstream psychology, like many academic fields, has historically marginalized justice frameworks including feminist principles. Although psychologists have questioned and analyzed gender differences since the 1800s (Marecek, 2001), feminist psychology did not emerge until the 1960s. Efforts to fully bring the feminist perspective into the spotlight did not grow significantly until the 1990s (Bond and Mulvey, 2000). At that time, Bohan (1990) suggested that feminist critiques of science and positivism were signs of a feminist reconstruction of psychology. Crawford and Marecek (1989) outline four frameworks used to study women in psychology from 1968 to1988, following a time of "womanless" research: women as exceptional, women as anomalies or problems, psychology of gender, and transformation. Each represents the importance of reflexivity

in shifting psychology toward gender inclusion and the need to question the political contexts of science.

Additionally, Lykes and Stewart (1986) found that the incorporation of feminist theory into psychology from the 1960s to the 1980s resulted in an increase in research by women, but without significant changes in methodology. Feminist perspectives were instead mainly confined to feminist rather than general psychology journals. Morawski and Agronick (1991) argue that methodology should not be the sole focus for mainstreaming feminist perspectives in psychology, but rather that epistemological and theoretical challenges must be targeted as well. Methods borrowed from psychology have also been seen in other fields as providing an unnecessary fixation on women's biology and sexuality in contexts where this would not be considered relevant for men. In fact, early on, Lerner (1969, p. 59) pointed out that:

> "… a great deal of excellent history about men has been written without the author's feeling compelled to discuss his subject's sex life or relationship to his mother in explaining his historical significance. In dealing with women, biographers are impeded by the necessity of dealing first with sex, then with the person."

While the field of psychology as a whole has far to go before feminist perspectives are considered mainstream, promising strides have been made in some sub-fields, especially community psychology (Bond *et al.,* 2000; Bond and Mulvey, 2000; Wasco and Bond, 2010), where paradigm shifts toward the inclusion of feminist theory are well underway (Angelique and Culley, 2003). Struggles for acceptance of feminist

principles remain more rooted in the biological foundationalism seen in areas such as clinical psychology, where sex and gender are seen as objective (Marecek, 2001). While not fully mainstreamed, feminist psychologists have long called for a change in methodologies to represent diverse groups of women, reflecting the third-wave feminism of the early 1990s (for example, see Landrine *et al.*, 1992).

Similar to the separation of collective justice from neoclassical economics, psychology has been criticized for abstracting human experience and bias through the declaration of laws of human behavior (Fine, 1994). However, feminist psychology's identification and union regarding the reform of scientific empiricism as a place for reform (as described by Morawski, 1994) gives hope for more broad acceptance of feminist principles. While neoclassical economics requires a broad reintroduction of ecological and social principles, psychology has not fully lost its grounding in this area due to its continued connection with human biology and society.

3.4.2. Economics as a Late Adopter of the Feminist Critique

Feminist perspectives are conveyed through similar foundational principles of collective justice and equity across the social sciences, yet there has been more resistance toward this framework in economics than many other fields (Nelson, 1992; Pujol, 1992). This leads to the question of whether there are some aspects of economics, rather than issues with the feminist critique, that cause a breakdown in the acceptance of feminist thinking. One possibility is that the messages of feminist research as a study of privilege, power relations, social structure, hierarchies, and deeply ingrained social biases, do not

resonate with neoclassical economists. What seems more likely, however, is that feminist principles contradict deeply held views within the dominant neoclassical paradigm.

Meagher and Nelson (2004) suggest that economics has resisted feminist theory for two reasons: (1) overwhelming reliance upon a single paradigm of neoclassical economic tradition and its mathematical models that are used to legitimize economic research; and (2) an underlying androcentric bias perpetuated by the tenets of neoclassical thinking. The collaborative and non-exploitative methods prioritized by feminist scholars (McDowell, 1992) also clash with the exclusionary frameworks of neoclassical economics (Jaggar, 2016). By relying upon narrow assumptions about human preferences and the ability to choose them, neoclassical economics closes itself off to addressing issues of equality (Feiner and Roberts, 1990). Many neoclassical economists do acknowledge social inequalities and injustices, but continue to base normativity on positivist theories and notions of equilibrium, and thus inherently exclude justice issues for women and minorities (Feiner and Roberts, 1990). It is through these perspectives that a patriarchal Victorian Era attitude toward justice perpetuates in mainstream economics (Pujol, 1995). Notions of the "rational economic man," after all, do not reflect most human experience (Meagher and Nelson, 2004).

Regarding an androcentric bias, Nelson (2010) suggests that a split between economics and social sciences along gender lines resulted in a fundamentally male focus within economics (based in mathematics and science) and a female focus in the social, "softer", sciences that continues today. This explanation supports the undermining of justice frameworks through an inherent prioritization of efficiency over equity or justice

within neoclassical economics that is incompatible with feminist perspectives. More recently, mathematical abstraction is seen in the rising dominance of finance in economic publishing (Fourcade *et al*., 2015).

Power, privilege, and exploitation must be central to economic questions if the field of economics is to have concern for collective justice like other social science fields. Central to the restructuring of economics to better address issues of equity is an understanding of humans' existence within a finite natural world. By embedding economy in society and within biophysical limits, interconnectedness and interdependence can be better understood without falling into reductionist traps (Spash, 2012). Current reliance on measurements of financial capital as indicators of wellbeing acts as a form of political lock-in, allowing policymakers to overlook environmental and social aspects of wellbeing (Stiglitz *et al.*, 2010). Alternative indicators of success are just one area that must be addressed to shift political thinking surrounding economics away from infinite growth and individualism.

While economics is not the only field to struggle with mainstreaming collective justice frameworks, the dominant neoclassical economic paradigm illustrates the problem of a field that has lost sight of how to effectively integrate and prioritize collective justice. Beyond the abstraction of economics from social and environmental realities, the field has become deeply insular, viewing economic production as "self-contained circular flow process unconnected to the anthropology, biology, or physics of the rest of the world" (Gowdy and Ferreri Carbonell, 1999, p. 339) and drawing from other disciplines at a much lower rate than other social sciences (Fourcade *et al*., 2015). Additionally,

there is much less dissent and a much stronger hierarchy among economists. Fourcade *et al.* (2015) find that economics not only has a high degree of agreement in its evaluation standards, but also that employment and publishing in the field favor top-ranked university departments more highly than in other social sciences.

Regarding cooperation with other disciplines, Hodgson (2000) suggests that the interdisciplinary work most comfortable to neoclassical economists is with some schools of anthropology and psychology that embrace individualism, as well as political scientists and sociologists that have adopted rational choice values. However, he concludes this would bring little novelty to mainstream economic thinking. Lazear (1999, p. 6) argues that economic abstraction can be both a strength and a weakness, but that compared with economists, "broader thinking sociologists, anthropologists and perhaps psychologists may be better at identifying issues, but worse at providing answers." Clearly, economists are aware that their field is not fully reflective of the complex world it intends to represent, but this has not resulted in a particular openness to exploring unorthodox views.

3.5. Collective Justice on the Fringe of Economics

Although justice has largely been ignored as a core aspect of neoclassical economics, modern-day economists do not all follow this same school of thought, just as the field as a whole has not outwardly rejected the integration of any type of justice framework. Challenges to individualist notions of justice include the socialist movement by Oskar Lange and others during the 1930s (Hodgson, 2000). The Austrian school of economic thought also includes moral character (as entrepreneurship) in a notion of

distributional justice that includes "discovered" income as an external piece of the pie. This perspective considers income that is gained when an individual realizes or finds value, such as through product innovation or resource prospecting (Kirzner, 1997). And those who believe economics has lost all semblance of justice argue that spirituality is key to regaining economics' lost moral compass, and focus on addressing this problem through the incorporation of religious doctrine in economics (see, for example, Mirakhor, 2014). Many other sub-fields acknowledge that neoclassical economics has not lost all notions of justice, but rather that the fundamental priorities of this dominant paradigm are misaligned with agendas of social equity and environmental sustainability.

Aside from these heterodox approaches, there are at least three formalized, interdisciplinary efforts by economists to bring justice to the forefront of economic decision-making. These include feminist, social, and ecological economics. Feminist economics provides a framework for understanding humans' role in the universe rather than solely their roles in society through promotion of equity and holistic consideration of economic outcomes (Perkins, 2007). This approach to economics includes factors such as power relations, the care economy, women in the labor market, and societal (rather than individual) needs. These qualities root feminist economics' in collectivism, which provides a space for the consideration of both social and environmental needs through a holistic perspective on wellbeing. Social economics takes an even broader approach toward applying justice in economics (Lutz, 2002). This field is concerned with cooperative market and non-market sectors, but also (and more importantly for the discussion of economic justice) the value of social relationships to an economy (Davis

and Dolfsma, 2008). Feminist values are sometimes incorporated into social economic applications, and the attempts of this branch of economics to account for social justice have similar, if not broader, goals as feminist economics.

A major concern for justice in both feminist and social economics surrounds Rawls' theory of justice, which many feminist scholars oppose due to the exclusion of distributional and societal barriers to equity (Matsuda, 1986; Young 1990; Henderson, 1997; Pelletier, 2010). Similarly, while some social economists have embraced Rawls' theory, others have taken issue with the individualism inherent in its basis in social contract theory (Lutz, 2002).

Finally, and broader still, is ecological economics, a more transdisciplinary approach to economics that has taken on justice through embracing methodological pluralism and a focus on sustainability built upon ecological, social, and economic welfare (Illge and Schwarze, 2009). This field has taken the stance that respect for ecological limits through control of an economy's scale can imply a justice framework for social sciences. This perspective acknowledges that infinite growth is both infeasible and unjust, thus requiring some level of strategic distribution of resources. Incorporating justice through an environmental basis follows the hierarchy of prioritization proposed by ecological economists for a sustainable future: first economic and ecological scale must be addressed, then justice, and then finally efficiency (Costanza *et al.,* 2015). This prioritization breaks from the neoclassical preference of economic efficiency above all. Neoliberal agenda such as free trade agreements, for example, have been criticized in

ecological economics for externalizing both environmental and social costs, creating problems in both areas (Daly, 1996).

Illge and Schwarze (2009) found that the ecological economic idea that justice between generations requires justice within generations marks a major break with neoclassical values. While ecological economics expands justice issues to take into account ecological impacts on humanity and vice versa, this transdisciplinary approach, expanding beyond the confines of the discipline of economics, has been criticized for taking too "shallow" a stance on justice in some cases (Spash, 2013). Values including ethics, equity, and justice have been of growing concern, yet still made up less than 3% of paper topics in the journal *Ecological Economics* from 1989 through 2009 (Castro e Silva and Teixeira, 2011). While broadening the applications of justice in economics, ecological economics has closely aligned with theories of justice posed by Rawls in 1971 (Norton, 1989; Penn, 1990). However, more recently there has been some effort to move the ethics of ecological economics away from a purely Rawlsian approach to justice toward a communitarian normative position (Pelletier, 2010).

Recognizing that the "social" is often superseded or ignored by the "ecological" concerns, there has been a recent reframing of the trans-discipline as "socio-ecological economics" (Spash, 2013). By emphasizing the social, all problems (whether environmental, social, economic, or a combination of such) are framed as ultimately a social choice problem (Spash and Kerschner, 2014). This movement toward a socio-ecological perspective is characterized by a realist perspective on ecological economic theories, particularly with respect to social construction and relativism, which are seen as

over-simplified reductions of society from its whole to its individual parts (Spash, 2013). By explicating both biophysical limits and social choice, this field may signal a promising step toward incorporating justice issues in a sustainable economic framework.

3.6. Conclusion

The potential for the feminist perspective to add to major economic development discussions is significant, particularly in the consideration of justice. Gendered issues such as time use, labor divisions, and societal expectations and roles have all been explored within economics, yet these are left out of most analyses relying upon a neoclassical foundation. Feminist principles offer a more robust set of tools to address these issues with respect to social equity, but they have yet to be embraced by a mainstream characterized by insularity, abstraction, and individualism. While the feminist perspective has had some success in economic policy areas, it too continues to be resisted in the majority of the field, especially with respect to academia (Meagher and Nelson, 2004).

The fields of anthropology, psychology, and geography have also faced challenges regarding the integration of feminist theory, yet ties to interdisciplinary practices and biophysical realities have allowed for the adoption of collective justice frameworks within their respective mainstream schools of thought, including feminist principles. Feminist, social, ecological, and socio-ecological approaches have all provided space for collective justice in economics by broadening focus to include issues such as social equity and environmental concerns, yet these views remain largely on the fringe of economic thought. Even with increased acceptance of feminist principles and

concerns for justice in the social sciences, this remains an ongoing struggle, and the belief that feminist issues have been solved is not only incorrect, but potentially harmful to future research and thought (Johnson, 2012).

Resistance to feminist theory and related collective justice frameworks condemns neoclassical economics to follow an abstracted and out-of-touch approach to characterizing human needs and wellbeing. Beliefs among groups of economists often differ substantially from public opinion (Sapienza and Zingales, 2013), suggesting that economists' priorities are not only outliers when compared with approaches like feminist and ecological economics, but also with regard for the needs and desires of the general population. In order to move economics away from its singular focus on market efficiency and closer to a frame of sustainability and justice, the field as a whole must revisit its own roots in moral philosophy and bridge to more contemporary social critiques of gender, power, and privilege, and the biophysical realities of production, distribution, and consumption. The continued abstraction of an economic system without social context for biophysical realism has created a discipline and policy framework that is dangerously untethered from the challenges of a human-dominated planet. By integrating collective justice in mainstream economics, this field once based in moral philosophy may be known once again for its moral power rather than its self-lauded political and financial muscle.

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CHAPTER 4: MEASURING EFFECTS OF GENDER INEQUALITY IN THE REPRODUCTIVE SECTOR ON ECONOMIC DEVELOPMENT

4.1. Abstract

Gender inequality is in part a result of the unequal sharing of unpaid labor by men and women. Time-use studies reveal that the burden of non-market labor on women is twice that of men in developed regions, and approximately three-and-a-half times greater in developing regions.[1] This type of work includes services that allow for intergenerational reproduction of a population through care, socialization, and education, providing hidden subsidies to other (often market-valued) areas of the economy by contributing to labor productivity. Despite its importance and contribution to overall wellbeing as well as labor productivity, the unpaid work that makes up a large portion of this "reproductive" sector is often overlooked in mainstream macroeconomics.[2] Further, while feminist economists have made strong theoretical arguments about the positive effect of unpaid labor (and in particular, caring labor) on the economy as a whole, there is little empirical evidence that tests this hypothesis. In this paper, we test this relationship by econometrically estimating the macroeconomic impact of both absolute unpaid care work and the gendered divisions of this work on development in sixty-two countries. In particular, we evaluate the effect of gender inequality in time spent in unpaid

[1] United Nations Statistics Division. (2015). *The World's Women 2015: Trends and Statistics*. New York: United Nations.

[2] Antonopoulos, R. (2008). "The Unpaid Care Work-Paid Work Connection." *Levy Economics Institute, Working Papers Series*.

reproductive work as well as public spending on social reproduction on macroeconomic development. Finally, we discuss the policy implications of our findings.

4.2. Introduction

Feminist economists, among others, have called into question the neoclassical economic fixation on the financial and productive sectors at the expense of social and ecological wellbeing (Pearson & Elson, 2015). The inequalities resulting from neoliberalism have resulted, for instance, in the current ownership of more than 50% of the world's wealth by only 1% of the world's population, while over one billion people subsist on less than $1.25 per day (Oxfam International, 2015). The proposal of a strong, equitable reproductive sector, in which social provisioning and personal time use support intergenerational human needs, offers one solution for a more just economic system.

Elson (2010) defines the reproductive sector as a "non-market sphere of social provisioning, supplying services directly concerned with the daily and intergenerational reproduction of people as human beings, especially through their care, socialisation, and education. It includes unpaid work in families and communities, organised unpaid volunteer work, and paid (but non-market) work in public services like health and education," (p. 203). While reproduction has historically been dependent on women to bear the bulk of its financial, social, and opportunity costs, the benefits of this work have been felt by society as a whole (Razavi, 2007). This unequal exchange is exacerbated in times of financial crisis, when austerity and structural adjustment measures disproportionately affect those that contribute to reproductive activities (Çağatay, 1998; Pearson & Elson, 2015). The need for economic inclusion of the costs of maintaining and

reproducing the labor force has long been acknowledged (Çağatay, 1998), yet this sector remains largely invisible in economic analysis and policymaking.

Reproductive work provides hidden subsidies to other areas of the economy by supporting other members of a population than the individual worker, yet the importance of this work is often unacknowledged in traditional economic measures (Antonopoulos, 2008). Miranda (2011), for example, using OECD data for twenty-six developed and three developing countries, finds that one-third to one-half of the countries' economies consisted of unpaid work that is not included in typical economic indicators such as GDP. This issue is inevitably intertwined with gender inequity, as the burden non-market labor and goods in economic systems falls on women more than twice as much as men in developed regions, and approximately three-and-a-half times more than men and in developing regions (United Nations Statistics Division, 2015b).

Gendered attitudes toward traditional roles of femininity and masculinity continue to shape the way that reproductive work is divided, even in societies that are considered relatively equitable (see Craig & Mullan, 2011, for instance). By placing due emphasis on unpaid labor and expanding away from a solely market-focused notion of economic valuation, traditionally female-dominated work may be more highly valued as a cultural necessity rather than as a woman's inevitable responsibility. Additionally, macro-level gender equality and empowerment has been shown to influence household-level outcomes in negotiating the highly gendered sphere of reproductive work (Lachance-Grzela & Bouchard, 2010).

In this paper, we consider the impacts of the reproductive sector on development and employment at the national scale in sixty-two countries. To approximate the reproductive sector, we consider both private inputs (through personal time-use and financial resources) and public spending on social protection, health, and education. We consider the interacting effects of the reproductive sector, economic development, and the share of female employment using ordinary least squares (OLS) and three-stage least squares (3SLS) regression. To conclude, we offer policy recommendations for governmental and intergovernmental bodies informed by our findings.

4.3. Background

Gender discrimination in economic systems exists in many forms, including gender norms in many parts of the world leading to an unequal burden for women in the unpaid reproductive sector (Elson, 2010; Pearson & Elson, 2015). For those concerned with social equity, the goal of economic growth by national leaders and financial institutions can be a double-edged sword. On the one hand, more highly developed countries tend to have less inequality. Conversely, the road to development is often paved with hardship, and does not guarantee equitable outcomes. Women's share of the labor force, for example, is shown to occur in a U shape in relation to economic development, such that women's labor force participation declines during initial industrialization, and only increases in later stages of development (Çağatay & Özler, 1995). Additionally, a more equal gender split in the labor force does not guarantee that opportunities for all jobs or wages are equally available to both men and women. The complex relationship

between development and gender inequality continues to be a source of concern for scholars and policymakers, not only in paid employment, but also in unpaid work.

Reproductive labor (including care work) has traditionally been delegated to women in many parts of the world. Early studies on care work focused on making women's work as visible as men's in economic analyses through the acknowledgement of traditional metrics' omission of household, care, and non-market activities often performed by women (Benería, 1999). Today, more is known about the divisions of men's and women's unpaid work, and it is clear that major gender divisions persist, even in countries with relatively low inequality (see United Nations Statistics Division, 2015, for information on global divisions of labor). Given current events related to economic development, recession, and questions of the impacts and sustainability of continued growth, some researchers have turned their focus to the effects of economic policies in studying the reproductive sector. Recession-related austerity measures have been of particular interest, as non-market care work positions women in a place of greater reliance upon social services, and thus they experience greater negative impacts of austerity than men (Fukuda-Parr, Heintz, & Seguino, 2013; Ortiz & Cummins, 2013). On a more global scale, unpaid work is expected to both increase and become less gender-equal during times of recession (Bettio & Verashchagina, 2014).

Equality in care work also plays a role in increasing resource scarcity and concern for a changing climate, as unpaid work inequality is linked with high rates of fertility. This is seen in part to be purposeful in order to ease unpaid work burdens, but results in a feedback of greater resource use and thus increasing unpaid work (Daily & Ehrlich,

1996). Support for gender equality in unpaid work is seen as one strategy for reducing population growth and conserving resources (Daily & Ehrlich, 1996). Additionally, more equitable decision-making power, such as that gained through more equal divisions of paid and unpaid work time, are associated with better nutritional outcomes for children, thus contributing to a healthier population (L. C. Smith, Ramakrishnan, Ndiaye, Haddad, & Martorell, 2003).

While gender disaggregation studies have quantified inequalities in macroeconomic systems, a lack of attention to isolating the reproductive sector and understanding feedbacks between the productive and reproductive sectors leaves important gendered questions regarding the labor force unanswered (Çağatay et al., 1995; Nallari & Griffith, 2011). Other methods of gendered macroeconomic modeling include the use of economic variables related to the structure of gender relations (for example, decision-making in various sectors), the two-sector approach that compares traditional macroeconomic sectors with the (unpaid) reproductive economy or other gendered economic system, or some combination of these methods (Çağatay et al., 1995). When contrasted through Computable General Equilibrium modeling, the two-sector (also called the two-system) approach has proven more effective in highlighting gender disparities than the gender disaggregation method (Fontana, 2014).

Remaining gaps in knowledge related to the reproductive sector surround the measurement of this sector and its broader macroeconomic and social impacts. A major reason for the absence in this type of research is that the reproductive sector is difficult to quantify and compare with market sectors, as there is no monetary wage associated with

unpaid care labor. Previous studies have valued care labor through an average national women's wage, an average national wage for the whole population, and specific job-related wages such as those related to the formal care sector. Dong & An (2015), for instance, estimated the size of China's reproductive sector based on time use data and valued time through 5 methods: as opportunity cost, as two different forms of economy-wide earnings, and as two different measures of replacement costs. By calculating these estimates, they were able to compare the magnitude of China's reproductive sector with its GDP. However, conversations surrounding the valuation of care work often come down to an oppositional dichotomy of caring versus payment, showing the deeply cultural constructions of unpaid work that shape the benefits and costs of publically supporting or privatizing reproductive work (Folbre & Nelson, 2000).

One way of moving the dialogue surrounding reproductive work forward has been to focus on other measurement options, such as Folbre's (2006) proposal to measure the care economy in terms of "time accounts." Time accounts, which can be based on time-use surveys, take an in-depth look at the ways that people spend time, often through personal diaries over the course of one or multiple days. These types of studies have been conducted in over 85 countries worldwide and reflect demographic, social, and economic factors that affect patterns of time use (see United Nations, 2016, for a full list of conducted time-use surveys). Time use can be incorporated in the valuation of the reproductive sector in several ways, including through comparative indices, consideration of disposable time, and attention to the care parity by gender (Folbre, 2006).

Previous time-use analyses of the gendered differences in unpaid work have centered on the idea of convergence in shares of reproductive work between men and women, as well as the cultural norms and institutional barriers that perpetuate inequity in this area. Kan, Sullivan, & Gershuny (2011), for example, use Multinational Time Use Survey (MTUS) data from several developed countries to reveal an increased convergence in time spent doing domestic work, but not without the persistence of barriers such as gender segregation in time and activities, and a slower move toward parity in southern (European) and corporatist societies. Hook (2006) also employed European and North American MTUS data to show that despite some convergence in men's and women's time use, this trend does not guarantee a path to equity, and are relatively unimpressive given substantial increase in women's paid employment. Shifts from paid to unpaid work for men, and unpaid to paid work for women, have been attributed to more equitable distributions in labor in seven industrialized countries since the 1970s (Gimenez-Nadal & Sevilla, 2012).

While much work has focused on unpaid work trends in developed countries, cross-country analyses that include developing countries remain scarce. This is likely due in part to the relative lack of time-use surveys conducted in developing countries, compared with developed, yet it is crucial to look at a larger cross-section of economic contexts than those with the highest levels of equality. This previous focus on developed countries has also limited the ability to evaluate reproductive sector gender equality in relation to development. In our current analysis, we aim to broaden the scope of knowledge regarding the gendered dimensions of reproductive work and development.

4.4. Relating the Reproductive Sector and Development

4.4.1. Defining the Reproductive Sector and Related Terms

Reproductive, non-market, and care work are terms that are often used synonymously (Folbre, 2006), despite being defined differently depending on context and author. Thus, we will take a moment to define these common terms and their use in our paper. Pearson & Elson (2015) describe the reproductive sector as "[supplying] services directly concerned with the daily and inter-generational reproduction of people as human beings, especially through their care, socialisation and education," including, "unpaid work in families and communities, organised unpaid volunteer work, and paid work in public services like health and education that produce for use rather than for sale" (p. 10). The labor input to this sector is provided through the "caring economy," which Folbre (2006) characterizes in four major categories: unpaid services, unpaid work that helps meet subsistence needs (non-market but included in the international system of national accounts), informal market work, and paid employment. Caring labor focuses on provisioning for children, the elderly, and infirm (Çağatay, 1998; Folbre, 2001a), and includes unpaid household support such as cleaning and cooking (see Gershuny and Robinson, 1988), community, and volunteer work, as well as paid non-market health and education work including the provision of public services, as these are not produced for the market and are charged to users through taxes rather than market pricing (Elson, 2010).

For the purpose of the current paper, the reproductive sector is considered as an umbrella term that incorporates both care work and social provisioning that may not be directly

tied to care. In this paper, we define the reproductive sector as that sector of the economy that provides paid and unpaid labor inputs that support the social and physical wellbeing of a population (see Figure 1). Two major inputs are thus considered: unpaid labor provided in the home, by the family, or through volunteer work, and paid work, either funded privately by the purchaser of care, of by the state. Private contributions to the reproductive sector are the personal time spent to provide human support such as housework, shopping, care for household and non-household members, volunteering, and travel related to these activities. These activities can either be performed or paid for, thus, spending and time-use are important pieces of private contributions to the reproductive sector. Direct care work provided through the market, for example, can involve paid childcare or medical care, while indirect market care work is provided through professions such as school and hospital support staff.

	Private	**Public**
Market	• Private expenditure for care work (funded by individuals/groups/businesses)	• Social protection expenditure for care work (funded by the state, provided by market) • Education expenditure for reproductive purposes (funded by the state, provided by market)
Non-market	• Personal unpaid time use through care for family members or others • Personal unpaid time use through volunteering	• Social protection expenditure for care work (funded and provided by the state) • Education expenditure for reproductive purposes (funded and provided by the state)

Figure 1: Matrix of the Reproductive Sector

While paid and unpaid reproductive labor have been previously studied, the amalgamation of these areas have rarely been modeled together, largely due to inconsistent and scarce data sources. Here, we consider these realms together as reproductive activities that support the wellbeing of whole populations. In order to

consider these two pieces, we examine the macroeconomic impacts of unpaid private labor through time spent on household work, child and adult care, volunteering, and other unpaid work. By considering differences in the ways that men and women spend time in unpaid work, we aim to better understand culturally constructed gendered divisions of labor. As our main purpose is to study macro-level gender inequality, it is crucial that the data used allows for disaggregation of men and women's labor inputs to the reproductive sector.

This paper focuses on quantifying unpaid reproductive work and the public provision of care due to the dearth of data on household spending patterns on provisioning, which vary widely across the 62 countries analyzed in this paper. Scarce data is available to properly account for private spending on paid care services, and therefore this is not included in our estimations of national reproductive sectors. As this portion of private contribution is excluded in our analysis, there is likely to be under-estimation of the size of the reproductive sector.

4.4.2. Macroeconomic Development and the Role of the Reproductive Sector

The relationship between the gender inequality and macroeconomic development warrants some discussion as this relationship provides the theoretical basis for our modeling approach. The basic link between these two factors is illustrated in Figure 2, with the gender distribution of employment as a transmission mechanism for the effects of gender equality in unpaid labor on macroeconomic development. Additionally, a feedback loop exists within this system, created by an inverse relationship between gender equality in paid and unpaid work.

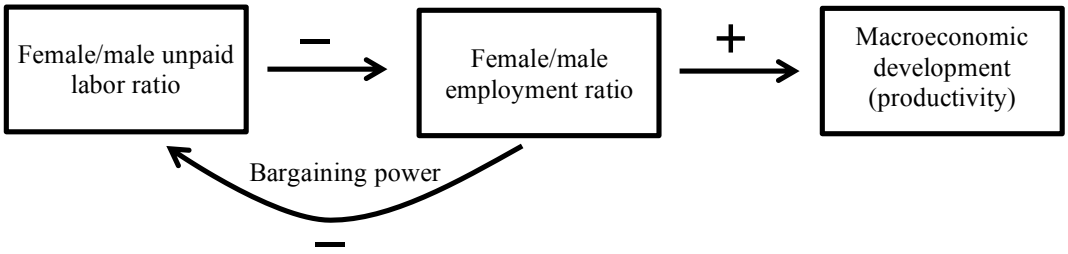


Figure 2: Illustrated relationship between gender equality in unpaid labor and macroeconomic development

Effects of gender equality in unpaid labor are apparent in both the short term and the long term. Gender equality in unpaid labor has been found to positively impact gender equality in employment due to the availability of more time to devote to paid work, particularly by women. Personal time is a limited resource, and therefore individuals with higher unpaid work burdens may be limited from engaging in the paid sector. As women shoulder greater responsibilities of unpaid work than men globally (United Nations Statistics Division, 2015b), the opportunities of individuals to engage in unpaid and/or paid work shape the gender division of employment. Pascall & Lewis (2004), for example, point to opportunities for greater gender equality through support for women in the workforce and encouragement of shared paid and unpaid duties by men and women. Gender inequality in employment has been found to negatively affect macroeconomic outcomes in terms of efficiency as well due to selection distortion, where the pool of talents that are evenly spread among men and women are not distributed evenly throughout the workforce (see Esteve-Volart, 2004, for example). Additionally, demographic effects, international competitiveness, and gendered differences in savings, spending, and governance strategies have been identified as causes of negative economic outcomes from gender gaps in employment (Klasen & Lamanna, 2009). Thus, in the

short term, greater gender equality in unpaid work positively impacts macroeconomic development via gender equality in employment as a transmission mechanism.

In the long run, the feedback loop between gender equality in unpaid labor and employment must be considered. As gender equality in unpaid labor fosters gender equality in paid work, this increased equality in employment encourages greater equality in unpaid labor as well, with greater bargaining power acts as the conduit for change in this case. Seguino (2013) also finds that economic equality supports greater bargaining power for women at the household level, which can lead to more egalitarian gender norms. Similar findings also occur at the national level, with Seguino (2011) attributing a rise in *per capita* national income with important changes to women's access to resources at the household level, in access to government-funded education and healthcare, through greater bargaining power for jobs, and via lower incentive for hiring discrimination. Additionally, previous studies indicate that greater bargaining power in intrahousehold resource distribution can positively contribute to children's wellbeing (Folaranmi, 2013; Luke & Munshi, 2011; D. Thomas, 1990).

In this paper, we develop OLS, 2SLS, and 3SLS models to estimate the simultaneous effects of development and gender equality in the reproductive sector. Development is measured as the under-five mortality rate per 1,000 children at the national level. The reproductive sector is measured through female and male unpaid time spent on reproductive activity, and public spending on social protection, health, and education as a percent of GDP. Bargaining power is inferred in this study through outcomes to child mortality (as a proxy for development), rather than explicitly through

measures such as income or asset holdings (for an overview of measurement of women's bargaining power, see Quisumbing & de la Briere, 2000). Our main hypothesis is that greater gender inequality in time spent doing unpaid work will be predictive of lower development, and that higher public provisioning of care will be predictive of greater development (ratios closer to one). Reproductive work–both unpaid and publically funded–is hypothesized to have a positive effect on economic development due to both the positive, mutually enhancing relationship between gender equality in employment and unpaid work, and the positive relationship between gender equality in unpaid work and development through the transmission mechanism of gender equality in employment. Because of the endogenous nature of these variables, we simultaneously estimate their functions. We additionally control for education, macroeconomic development, technology, development, and labor factors in order to isolate the macroeconomic effects of the reproductive sector.

In considering the role of gendered differences in time use on economic growth, we model what Nancy Folbre (2001b) refers to as the "Production of People by Means of People." Thus, the labor input to our model is a function of paid (P) and unpaid (U) labor:

$$Y = A(K, L_P, L_U).$$

where Y is output, A is a measure of technology, K is capital, and L is labor. This differs from a traditional neoclassical Solow growth model in which:

$$Y = A(K, L)$$

The Solow model has been extensively critiqued because of its focus exclusively on the supply side, ignoring demand side constraints to growth. One issue with the Solow

growth model (and most other growth models) is the treatment of labor as an unproduced input. Feminist economists (and others) have adapted neoclassical growth models to better address questions related to inter- and intra-group inequality by considering gender differences in labor, time use, and education. Braunstein (2008), for example, describes how the Solow model (and thinking by its users) has evolved to acknowledge a positive relationship between gender equity and economic growth. Knowles, Lorgelly, & Owen (2002) apply a Solow model in estimating the effects of gender gaps on educational development by viewing male and female education as separate production inputs (Abu-Ghaida & Klasen, 2004).

Equation 1 shows the estimated development model equation with the under-five mortality rate per 1,000 children at the national level, (*U5MR*), for country *i*. To isolate the effects of the reproductive sector, additional control variables are included to account for other aspects of labor and capital, including educational disparities, inequality, and macroeconomic characteristics of each studied country.

Equation 1: Predicting Level of Development (with men's and women's average unpaid work time)

$$\ln(U5MR_i) = \alpha + \ln(T_{F,i}) + \ln(T_{M,i}) + EMP_i + \frac{EMP_{F,i}}{EMP_{M,i}} + \ln(TE_i) + \ln(GDP_i) + \varepsilon$$

The use of average unpaid work time by men and women as independent variables in Equation 1 is a traditional metric of time-use measurement between genders. We feel it is also important to also consider the average amount of time spent by the population and the gender division of this time as well, which leads us to an alternative first stage of our 3SLS model, Equation 1':

Equation 1': Predicting Level of Development (with population average and gender division of unpaid time use)

$$\ln(U5MR_i) = \alpha + \ln(T_i) + \frac{T_{F,i}}{T_{M,i}} + EMP_i + \frac{EMP_{F,i}}{EMP_{M,i}} + \ln(TE_i) + \ln(GDP_i) + \varepsilon$$

where T represents unpaid time use, EMP is the female (F), male (M), or weighted population share of employment, TE is average total years of education, GDP is GDP *per capita*, and ε is the error term. Additionally, both versions of Equation 1 are modeled as a 2SLS equation in order to instrument female to male employment ratio. Instruments used here are the ratio of female-to-male unpaid time use $\left(\frac{T_{F,i}}{T_{M,i}}\right)$, the female-to male education ratio $\left(\frac{TE_{F,i}}{TE_{M,i}}\right)$, and public spending (PS_i).

While the OLS and 2SLS models examine the effects of the reproductive sector on development, it is also important to model the endogenous effects of these two factors, as well as employment, which is considered here as a transmission mechanism between unpaid work and development. Equation 2 shows the second stage of the 3SLS model, which estimates the ratio of time spent by females to males on unpaid labor. We expect that the higher shares of women in wage employment, higher public spending on the reproductive sector, and greater levels of public infrastructure will result in a decrease in the gender differential in unpaid time use. In addition to the variables defined above, *PI* refers to public infrastructure, measured as the percent of a population with access to improved sanitation facilities, and *PS* is social protection and health spending as a percent of GDP.

Equation 2: Predicting the ratio of female to male time spent doing unpaid labor

$$\frac{T_{F,i}}{T_{M,i}} = \alpha + PS_i + \frac{EMP_{F,i}}{EMP_{M,i}} + PI_i + \varepsilon$$

Equation 3 is used to estimate the effects of gendered differences in unpaid time use on gender inequality in employment.

Equation 3: Predicting the ratio of female to male employment

$$\frac{EMP_{F,i}}{EMP_{M,i}} = \alpha + \frac{T_{F,i}}{T_{M,i}} + PS_i + \frac{TE_{F,i}}{TE_{M,i}} + \ln(GDP_i) + \ln\left(GDP_i^2\right) + \varepsilon$$

Our OLS models consider the effects of the predictors in our three equations separately, as an indication of the fit of the simultaneous models (e.g. allowing for comparison of the signs of predictor variables across models). The 3SLS model considers the simultaneous effects of Equations 1, 2 and 3. Both versions of Equation 1 are modeled in order to account for the female to male employment ratio as an independent variable. In Equation 1, this variable is treated as truly independent, while in Equation 1', it is considered as an instrumented independent variable that is dependent upon the ratio of female to male unpaid time use, public spending on reproductive provisioning, and GDP *per capita*.

The models developed and employed here are intended to shed light on the complex relationship between the reproductive sector and economic growth, with particular focus on the importance of unpaid time use. Due to this focus, many other forms of inequality are not accounted for in these models, and should be included in broader discussions of social and economic disparities.

4.5. Variable Selection and Relevant Data

4.5.1. Variables Used in this Study

Gendered divisions of labor have long been considered a metric of gender inequity. Divisions in paid and unpaid time use are valuable in showing the ways that work is divided between women and men, whether due to biological constraints (e.g., breastfeeding a child), cultural norms (e.g. expectations of women's cooking, cleaning, or care work), or personal preferences. Due to the endogenous nature of gender equality and development, simultaneous equation modeling is employed to estimate development, and gender equality in paid and unpaid work. In addition to effects of the reproductive sector on gender equality in employment and development, we control for effects of education, macroeconomic, technology, and development. All data was gathered for 1999-2013, as available. Given that most countries had limited data available for private inputs to the reproductive sector (as personal unpaid time use), our models are cross-sectional so that countries with more than one year of information do not over-influence the models. Thus, data is based on only the most recent time-use survey conducted for each country, with control variable data gathered for the year of each survey. Control variables are listed in Table 1.

Table 1: Variable Information

Data Category	Data	Eqn. 1	Eqn. 1'	Eqn. 2	Eqn. 3	Equation Symbol	Data source
Development	Under-5 mortality rate per 1,000	**X**	**X**			U5MR	World Bank, 2015
Reproductive sector	Female/male ratio of private care (unpaid work time)		X	**X**	X	$\frac{T_F}{T_M}$	Time use surveys: UNDP Human Development Report Office (2015), the OECD Gender Data Portal (2014), and MTUS (Gershuny & Fisher, 2015); pop. weights: World Bank (2015)
	Average private care (pop. weighted average)		X				
	Average private care by gender (unpaid work time)	X				T_F (female) T_M (male)	
	Public care (social protection & health spending as % GDP)			X	X	PS	ILO, 2014; World Bank, 2015[3]
Education	Pop. (15+) average years total schooling	X	X			TE	Barro & Lee, 2013[4]
	Female/male (15+) ratio of average years total schooling				X	$\frac{TE_F}{TE_M}$	
Macroeconomic	GDP *per capita*	X	X		X	GDP	World Bank, 2015
	GDP *per capita*^{2}				X	GDP^2	
	% pop. with improved sanitation access			X		PI	
	Female/male (15+) employment to pop. ratio (ILO estimate)	X*	X	X	**X**	$\frac{EMP_F}{EMP_M}$	
	Employment to 15+ pop. ratio (ILO estimate)	X	X			EMP	

Notes: Bolded variables indicate the dependent variable for each equation. (*) signals that two versions of the equation estimating under-5 mortality rate are included in this study. In one version (a), female/male employment is included as a control variable, and in another (b), female/male employment is instrumented as a function of the female/male unpaid labor ratio, the female/male education ratio, and public care

[3] Social protection data was taken within three years of the country's time-use surveys' publication date(s) (in cases where a publication date spanned two years, the earlier year was considered as the publication date). When time-use data could be matched with earlier or later sets of social data, the earlier data was chosen in order to better capture effects that changes in social spending might have on time spent doing unpaid work.

[4] This educational stock data is collected at 5-year intervals, and therefore cannot be matched with all exact survey years. This data was matched with the closest year possible (with a maximum 3-year gap), rounded to the earlier year when falling 3 years from either closest educational data year.

4.5.1.1. Effects of the Private Side of the Reproductive Sector on Development

To control for the effects of gender equality in the private portion of the reproductive sector on gender equality in employment, we include the ratio of female to male total unpaid time use as an independent variable. More equal shares of time use in care work and other reproductive activity are associated with greater economic development, public policies supporting gender equity, and demographic influences (Miranda, 2011). Therefore, we expect that more equal divisions of unpaid labor will be a predictor of greater gender equality in paid work and higher levels of development.

Data on the amount of unpaid work conducted by men and women was gathered from time-use surveys[5] conducted in sixty-one countries between the years 1999 and 2013. This data was gathered from the United Nations Development Programme's Human Development Report Office (Charmes, 2015; UNDP Human Development Report Office, 2015)[6]. While eighty-seven unique surveys were taken in the sixty-one countries during this time period and harmonized by UNDP, only the most recent survey for each country was used for our models due to the high prevalence of countries with only one survey taken during the study period. UNDP defies total unpaid work in Table A4.1 of the 2015 Human Development Report as "working time in providing unpaid domestic services for own final use, providing unpaid caregiving services to household members and providing community services and help to other households." Unpaid time

[5] Average amounts of time (in minutes) performed by men and women were collected for all cases.

[6] Time-use data from UNDP is available as part of the series used to compute the Human Development Index (HDI) and rankings. See UNDP Human Development Report Office, 2015, Table A4.1.

use data from the UNDP is available only as the total amounts for men and women in each time use survey. Summary statistics for the reproductive sector, including both private (time-use) and public (social protection and health spending) aspects, are listed in Table 2.

Table 2: Summary Statistics for the Reproductive Sector

	N	Min	Max	Mean	Std. Dev.
Female/male ratio of private care (unpaid work time)	61	1.24	11.37	3.24	2.21
Average private care (pop. weighted average)	61	105.50	299.2921	191.89	36.18
Average private care (female)	61	188.00	442.00	272.72	48.33
Average private care (male)	61	18.00	194.00	110.09	46.47
Public care (social protection & health spending as % GDP)	61	0.50	32.07	14.27	8.71

Additional time-use information were gathered from two other sources that have harmonized national and international time-use studies in their databases: the OECD Gender Data Portal (2014) and the Multinational Time Use Study (MTUS) (Gershuny & Fisher, 2015), in order to perform a check of robustness on the models specified for the surveys harmonized by UNDP. The definition of unpaid work varies somewhat between the three databases (see Table 3 for comparison). MTUS surveys allowed for the totaling of specific categories of time use, so total unpaid time use for these surveys was summed using similar categories to those used by the OECD Travel related to household activities was not included in OECD and MTUS unpaid work totals in this study in order to maintain consistency with UNDP surveys, which does not distinguish between paid and

unpaid work-related travel[7]. In both the OECD and MTUS surveys, unpaid work categories with no information provided were assumed to be zero minutes.

Table 3: Unpaid Time Use Categories from UNDP, OECD and MTUS Data

UNDP[8]	OECD Category[9]	MTUS categories compiled for this analysis
N = 87[10]	N = 29	N = 9
Domestic work	Routine housework	Food preparation and cooking; setting a table, washing or putting away dishes; cleaning; laundry, ironing, and clothing repair; maintaining home or vehicle, including collect fuel; other domestic work; gardening or picking mushrooms; walking dogs
n/a	Shopping	Purchase goods
Care work (care of children, of adults)	Care for Household Members (childcare and adult care), care for non-household members	Physical, medical child care; teach, help with homework; read to, talk or play with child; supervise, accompany, other child care, adult care
Voluntary work (care of other households, work for the community)	Volunteering	Voluntary, civic, organizational act
n/a	Other unpaid	n/a

Despite efforts to harmonize surveys across the three datasets, incongruities between time use accounting remained. Thirty surveys that were included in more than one database (those surveying the same country and year of publication) were used to test for discrepancies in accounting for unpaid work between the three databases. Based on a test of kurtosis, unpaid work time for women and men in the UNDP data group (N = 61

[7] Charmes (2015) explains this categorization as a byproduct of inconsistencies in time-use surveys, some of which do not fully disaggregate travel by purpose (e.g. related to paid or unpaid work)

[8] These groupings were determined by Charmes (2015), but only included as an aggregate "unpaid work" variable in data published in the 2015 Human Development Report.

[9] Detailed activities included for each time-use survey and category are available from the OECD at https://www.oecd.org/gender/data/balancingpaidworkunpaidworkandleisure.htm

[10] Only the most recent surveys from each country were included in our models, thus, the number of surveys listed here is higher than the number of countries and surveys considered in our analysis.

countries) has kurtosis values of 4.37 and 1.95, respectively (with a normal distribution having a kurtosis value of 3.00). The OECD and MTUS data group (N = 29 countries) had kurtosis values of 3.24 for women's unpaid work and 2.54 for men's unpaid work. As kurtosis values were within +/-1.00 of a normal distribution, unpaid time use in the thirty duplicate surveys was compared using paired-sample t-tests to evaluate statistical differences in the three databases. Despite being highly correlated with one another (R = 0.89 for women's unpaid time use, and R = 0.92 for men's unpaid time use, for the twenty-seven time use surveys included in both databases), the UNDP and OECD databases were found to be significantly different from each other at the 95% confidence level for both women and men's unpaid time use, and therefore the surveys in these databases were not comparable. MTUS data was found to be not significantly different from either the OECD or UNDP data at the 95% confidence level in the paired-sample t-test, although paired sample correlations revealed weak correlations between women's unpaid time use in the MTUS compared with either other database. However, correlations may be unreliable as only seven time-use surveys in the MTUS database overlapped with UNDP data, and only four overlapped with OECD data.

Due to the known disparities in time accounting in several of the time-use surveys studied here, our models are estimated using surveys from the UNDP database, and compared with the combined MTUS and OECD time-use surveys in order to increase robustness in our estimation. These disparities are likely to exist due to the varying definitions of unpaid work highlighted in Table 3. MTUS surveys are combined with OECD surveys rather than UNDP surveys (despite paired-sample t-tests showing non-

statistically significant difference with either) because the MTUS and OECD have similar country profiles, covering mostly highly developed, wealthy countries. In the case of the four surveys that are included in both the OECD and MTUS databases (Netherlands 2005, South Africa 2000, Spain 2009, and the UK 2005), OECD values of minutes of unpaid work for men and women were used over MTUS values.

Both data groups include an uneven balance of countries related to global regions, with developed countries in Europe dominantly included. Generally, the OECD and MTUS datasets cover more developed countries than UNDP, although surveys from three non-OECD member countries (China, India, and South Africa) are notably included in the OECD set as well. Additionally, twenty-seven countries appear in both survey data sets, thus, modeling both sets improves robustness of the models, but does not greatly influence the number or diversity of countries studied.

Table 4 summarizes time use survey, development, and regional characteristics within the two data sets. This table shows the relatively higher level of development in the OECD and MTUS data group through the lower under-five mortality rate, and a more equal average division of unpaid time use between men and women. See Appendix for summary statistics and further information on the OECD and MTUS database sample.

Table 4: Data Information on Time-Use Survey Data Groups (the most recent survey from each country only)

		Surveys from UNDP	Surveys from OECD and MTUS
	N (number of countries)	61	29
	Mean year of survey	2007.62	2005.29
	Mean female/male unpaid time use ratio	3.24	2.65
	Mean measure of development: under-5 mortality rate per 1,000	22.49	12.72
Region	East Asia and Pacific	8 (13.1%)	5 (17.24%)
	Europe and Central Asia	28 (45.9%)	19 (65.52%)
	Latin America and the Caribbean	8 (13.1%)	1 (3.45%)
	Middle East and North Africa	7 (11.5%)	0 (0.00%)
	North America	2 (3.3%)	2 (6.90%)
	South Asia	1 (1.6%)	1 (3.45%)
	Sub-Saharan Africa	7 (11.5%)	1 (3.45%)

Note: Regions are based on country groups determined by the World Bank. For a list of countries in each region, see <http://data.worldbank.org/about/country-and-lending-groups>

Given the slow variation of time-use at the macro scale, the fourteen-year variation in survey data (spanning 1999-2013) is not expected to have a dramatic effect, despite not accounting for social, political, or environmental shifts that may have occurred in countries since these surveys were conducted. The two data groups used in our model estimation are limited in their ability to capture the complexities of women and men's involvement in unpaid reproductive work, as they are essentially snapshots in time. Furthermore, estimates of time spent multi-tasking cannot be fully captured by time-use surveys, even in instances where more than one simultaneous activity may be recorded. By failing to capture the intensity of unpaid work, these surveys leave out an important facet of inequality. As our goal is to assess the impact of unpaid time use and governmental support on development, the absence of data on multitasking is unlikely to

cause problems that might occur if we were attempting to monetize or otherwise place value on paid versus unpaid time doing various tasks.

While GDP and GNP growth rates are more traditional metrics of development, these were not appropriate measures in this study, as the data analyzed spans a fourteen-year period. Thus, we employ under-five mortality rate as a more stable metric of development. Social indicators of development have long been considered more appropriate measures of development than GNP due to their expression of outcomes related to poverty, inequality, and other multifaceted issues that are not captured or wholly explained by GNP (Hicks & Streeten, 1979). While many social metrics of development exist, including life expectancy, literacy, school enrolment, calorie supply, infant mortality, and potable water or sanitation access (Hicks & Streeten, 1979), the under-five mortality rate (per 1,000) is used as a measure of development, as this metric has been found to reflect levels of poverty (Deaton, 2001). Issues related to country stability, such as macroeconomic shocks, are also associated with rises in infant mortality (Baird, Friedman, & Schady, 2010). This metric has previously been used as controls for gender equality models by Klasen (2002) and Klasen & Lamanna (2009), who relate gender inequality in education to population health. Other metrics of development were considered for this study, but ultimately not included. Life expectancy, for example, was not included in our models due to overlapping effects with infant and child mortality (Deaton, 2008). Other variables are likely to be collinear with measures in our models. Literacy and other educational variables are likely to trend with the educational variables that we use to control for human capital, and water and sanitation access are related to

our infrastructure control variables. We associate higher levels of child mortality with lower development and expect that higher gender inequality in employment and unpaid work will result in higher levels of mortality. This hypothesis is supported by the observed widening gap between amounts of unpaid work performed by men and women with higher rates of child mortality (correlation coefficients of -0.14 for women and -0.58 for men), and the overall negative relationship between under-five mortality rate and total unpaid work weighted for the total population (correlation coefficient of -0.48) shown in Figure 3.

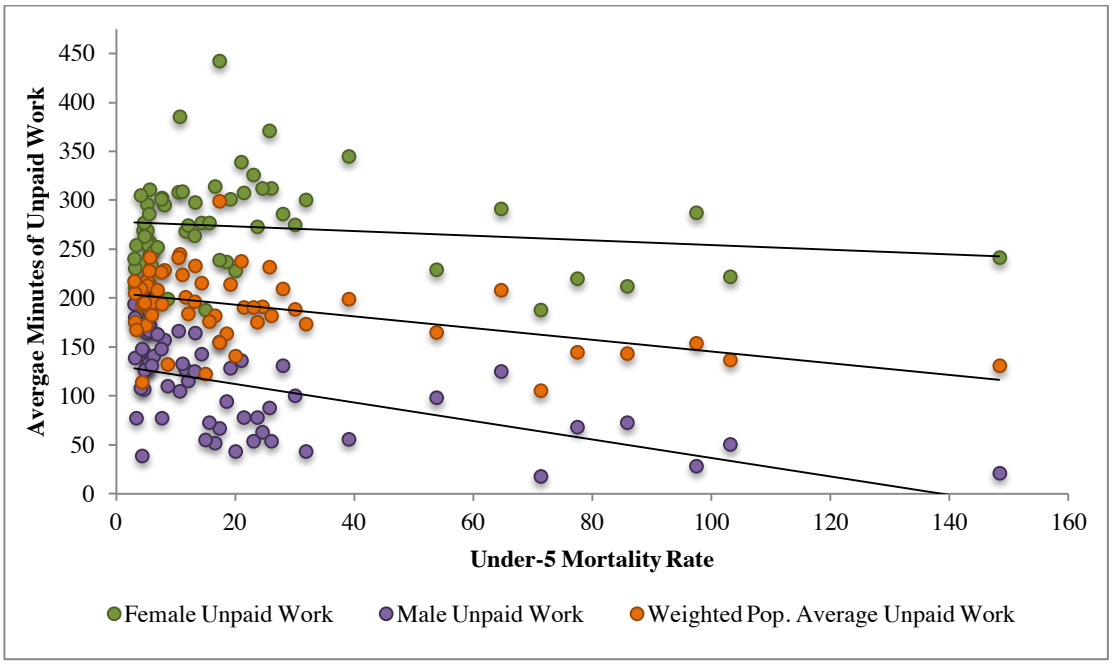


Figure 3: Under-Five Mortality Rate and Average Unpaid Work, UNDP data group[11]

[11] Note: Population weighted by percentage of female and male population for each country in the year that the corresponding time-use survey was conducted. In the case of surveys conducted over multiple years, the earlier year was used. Population data was retrieved from World Bank (2015).

4.5.1.2. Effects of the Public Side of the Reproductive Sector on Development

We defined public spending on the reproductive sector as social provisioning through direct government expenditures on social (unemployment protection, employment injury protection, disability benefits, maternity protection, and old-age pensions), health, and education services. Total annual public social protection expenditure was calculated by the ILO (2014) as the sum of expenditure (including benefit expenditure and administration costs) of all existing public social security/social protection programs in a country, corresponding to the Social Security (Minimum Standards) Convention, 1952 (No.102) which established nine classes of benefits: medical care, sickness benefit, unemployment benefit, old-age benefit, employment injury benefit, family benefit, maternity benefit, invalidity benefit and survivors' benefit, plus other income support and assistance programs, including conditional cash transfers, available to the poor and not included under the above classes (ILO, 2014). While these benefits do not all fall into the category of "care," we consider all of these factors to be important provisions for the reproduction for "the daily and inter-generational reproduction of people as human beings," as previously defined by Pearson & Elson (2015, p. 10). Furthermore, ILO data do not allow disaggregation of these benefit classes at the national level. Thus, we considered total annual public social protection expenditure as an approximation of the funding mechanism for the public labor input to the reproductive sector. Government expenditure on education included the total local, regional and central government expenditure on education in current, capital, and transfers, and expenditure funded by international transfers (World Bank, 2016b).

The effect of the public portion of the reproductive sector on gendered employment was captured through total annual public social protection expenditure and government expenditure on education as control variables[12]. Pearson & Elson (2015) found that women are more reliant upon social spending (largely due to unequal gender norms regarding paid and unpaid work), such that decreases in social spending through austerity measures more negatively impact women than men. Public spending on health has shown positive returns in both in the short term (Reeves, Basu, McKee, Meissner, & Stuckler, 2013) and the long term (Suhrcke *et al*., 2006). Social spending has also been associated with positive returns (Alderman & Yemtsov, 2012). As a result of these previous findings, we expected that higher percentages of social spending in relation to GDP would contribute to both gender equality in employment and macroeconomic development. Additionally, we anticipated that higher percentages of social spending relative to GDP would be linked with higher macroeconomic development due to the potential for positive returns on social spending, such as those found from in previous studies.

The year of social protection data used for each country matches the year of time use survey (in the case of twenty-four countries), or when unavailable, taken up to three years from the time of survey (twenty-six countries have social protection data taken one year before or after their time use survey was taken, nine have data from two years away, and two have data from three years before or after the time use survey).

[12] One limitation of social spending data is that it cannot be disaggregated by gender, which would have provided more insight into the distributional effects of such spending for instance, spending on maternal health services could be considered more directly beneficial to women than men).

4.5.1.3. Effects of Control Variables on Development

Control variables were selected based on previous literature and tailored to meet the requirements of the analyzed time-use survey dataset.

Table 5: Summary statistics for control variables

Data Category	Data	N	Min.	Max.	Mean	Std. Dev.
Development	Under-5 mortality rate per 1,000	61	3.10	148.30	22.49	28.69
Education	Pop. (15+) average years total schooling	58	1.97	13.18	9.24	2.28
	Female/male (15+) ratio of average years total schooling	58	0.58	1.18	0.94	0.11
Macroeconomic	GDP *per capita*	61	1330.37	132972.30	23040.26	20952.02
	% pop. with improved sanitation access	60	10.40	100.00	82.29	24.64
	Female/male (15+) employment to population ratio (ILO estimate)	61	0.18	0.96	0.68	0.20
	Population (15+) employment to population ratio (ILO estimate)	61	34.60	86.30	56.36	11.79

Effects of schooling on development are controlled through the average years of schooling for the 15 years and older population, and a gender ratio of female to male average years of schooling for this population. These two variables act as population stock variables to control for workforce gender inequality in both in-school and out-of-school populations. In investigating gender gaps in education and employment, Klasen & Lamanna (2009) consider the following education-related variables: the number of years of schooling for the population, the absolute (annual) growth in male years of schooling, absolute (annual) growth in female years of schooling, absolute growth in total years of schooling, the female–male ratio of schooling, and the female–male ratio of the growth in

the years of schooling. As our analysis is not a panel study like that conducted by Klasen & Lamanna (2009), flow variables regarding growth in years of schooling are not appropriate to use here. However, we follow a similar method of controlling for population schooling as well as gendered opportunity for schooling through a female/male schooling ratio. We expect that overall total years of schooling and more equitable gender ratios will be positively correlated with higher gender equality and development, following (Klasen, 2002), where initial gendered ratios in school were positively associated with economic growth (with a small, though significant, effect), and Klasen & Lamanna (2009), which had positive, though non-significant, effects. Higher levels of education are also associated with more gender equitable attitudes (Seguino, 2011).

Gender inequality is measured here through ratio of female to male employment, rather than the ratio of women and men in the labor force, due to the inclusion of those that are temporarily laid-off or are otherwise unemployed or away from work with or without pay (see Seguino, 2007, Appendix A, for further detail). In this paper, we measure this ratio as the female employment to population ratio divided by the male employment to population ratio, following (Braunstein & Seguino, 2012). This data was chosen over data for all paid sectors in order to provide data for more countries. We expect that a more equal workforce will result in increased development and that a more equitable ratio of unpaid work between men and women will yield greater gender equality in employment as well.

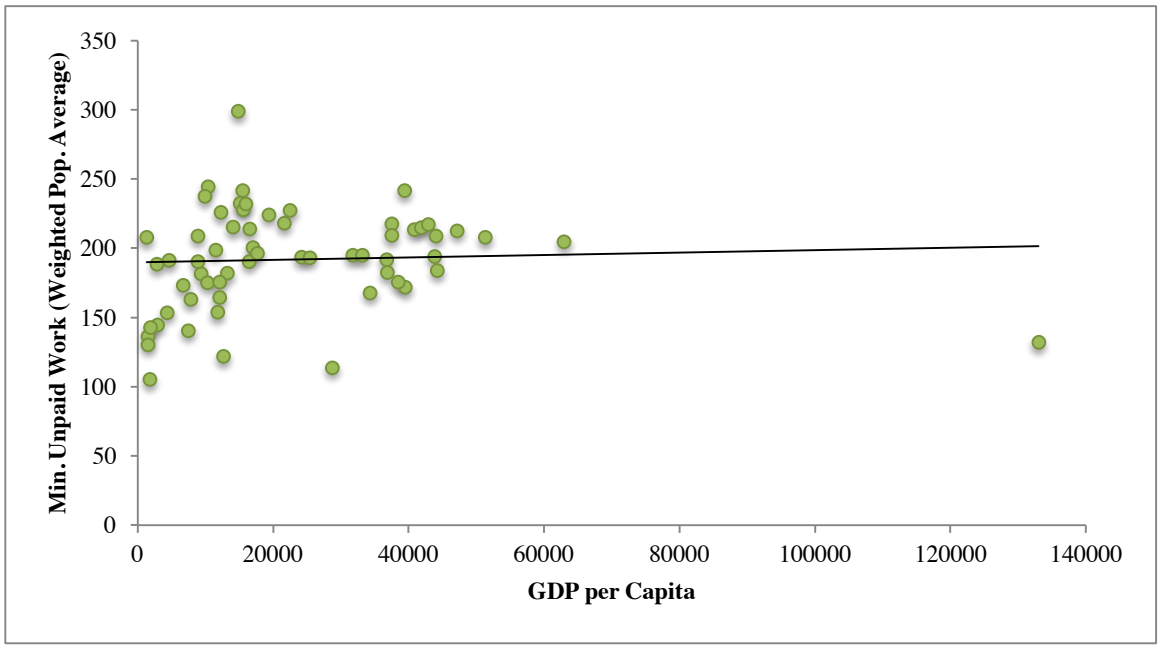
Relative rates of female and male employment have long been considered as a metric of gender equality, despite uneven progress in achieving more equal rates (England, 2010). Employment is also deeply connected to the reproductive sector, as unpaid care and household work influence the amount of time available to participate in paid work, the quality and type of work that is available to those with current or previous reproductive obligations, and the pay that individuals receive in the market. Benería (1992) highlights many of the issues that come with directly substituting paid and unpaid work in economic modeling, particularly for the aforementioned reasons.

We focus here on employment rates, rather than labor force participation, as we wish to consider only those who are employed, and not those who are seeking paid employment. This is in part because women's unemployment is higher than men's in most countries (United Nations Statistics Division, 2015b), suggesting embedded gender inequalities in work-seeking that are beyond the scope of the current study. Further, employment rates and labor force participation (though often highly correlated, such as in data used by Klasen & Lamanna [2009]) can reveal different effects on gendered work behaviors. Fuwa (2004), for example, finds that in economically developed countries, women's full-time employment rates influence gendered divisions of household work, while labor force participation does not have this effect. While employment rates do not account for differences in the quality of work available to men and women, they do shed light on overall opportunities for each gender to engage in paid work.

GDP *per capita* is included as a control for income growth in modeling gender equality. As seen in Figure 4, a slight positive relationship between population average

unpaid work and GDP is observed (correlation coefficient of 0.05). This relationship is stronger (correlation coefficient of 0.27) when excluding data from Qatar, which is an outlier in terms of GDP *per capita*.

Figure 4: Population Average Unpaid Work and GDP per Capita[13]

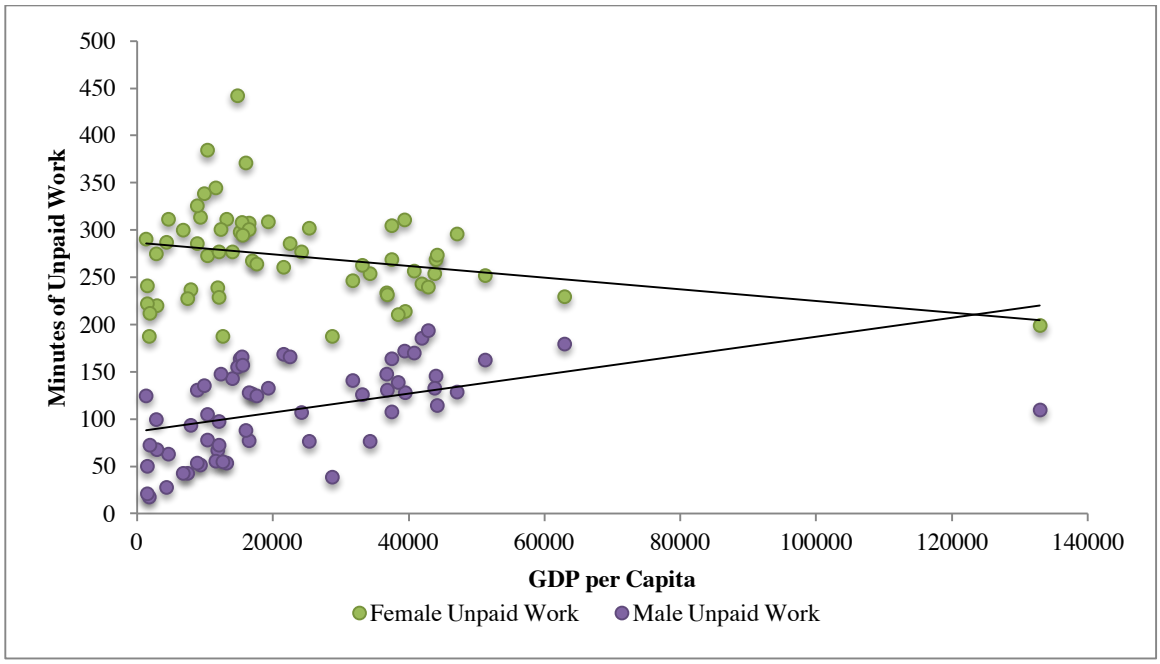


GDP *per capita* is expected to have a positive relationship with gender equality, as higher incomes are generally associated with greater quality of life for women due to increased access to resources (see Seguino, 2011). Economic development has been associated with a U-shaped trend in women's participation in the labor force, such that women's labor force participation declines during initial industrialization, only increasing in later stages of development (Çağatay & Özler, 1995). To control for this relationship,

[13] Note: Population weighted by percentage of female and male population for each country in the year that the corresponding time-use survey was conducted. In the case of surveys conducted over multiple years, the earlier year was used. Population data was retrieved from World Bank (2015). Qatar is included in the model despite its outsized GDP *per capita* in order to maximize sample size and regional diversity of included countries.

GDP *per capita* and GDP *per capita* squared are included as control variables. Effects of economic structure are captured through manufacturing value added as a percentage of GDP, following Seguino (2007), who links this metric to improved job access for women. Thus, gender equality is expected to increase along with this factor. Bittman et al. (2003) find significant impacts of income on unpaid time use, but that while women's time use generally drops with increased earnings, but men's time does not greatly rise in relation to their lowered share of household income. While the data we use here does not take disaggregate women's and men's earnings, overall *per capita* GDP shows a similar effect with unpaid time use, in that women's unpaid time use is generally lower in wealthier countries, but men's unpaid time use does not rise to meet this at a similar rate (correlation coefficient of 0.45). Men's unpaid time use and GDP, however, is more highly correlated than women's unpaid time use and GDP (correlation coefficients of 0.45 for men's unpaid time use and GDP and -0.27 for women's time use and GDP), suggesting that men do not necessarily replace women's unpaid work, but rather add more of their own independently as their wealth increases. See Figure 5 for information on this relationship for countries with time-use surveys in the UNDP database, and the Appendix for information the OECD/MTUS database country sample.

Figure 5: Average amounts of unpaid work by men and women, UNDP data group



Other macroeconomic effects are controlled through public infrastructure investment (measured as the percentage of the population with improved sanitation facilities). Infrastructure access has been identified as an influence on the allocation of women's time, including in levels of domestic work (Agénor & Otaviano, 2012). As infrastructure access is also related to overall development, we include a general metric for infrastructure in our model.

4.5.1.4. Relationships Between Control Variables

A correlation matrix reveals expected relationships between dependent and independent variables. The under-five mortality rate is negatively correlated with amounts of unpaid work and social protection spending, and positively correlated with gender inequality in unpaid work. Amounts of unpaid work performed by women and men are positively (though weakly) correlated with one another. Gender inequality in

unpaid work is negatively associated with population average unpaid work, suggesting that more equitable unpaid work environments do not equate to more overall unpaid work. Gender inequality in unpaid work is also negatively associated with social protection and health spending, GDP *per capita*, population years of education, gender equality in education and employment, access to improved sanitation, and population employment. The public side of the reproductive sector included here, social protection and health spending, is positively correlated with gender equality in unpaid work, employment, and education.

Table 6: Correlation matrix (for countries with data available for all variables; N = 57)

	Under-5 Mortality Rate	Unpaid Work (Female)	Unpaid Work (Male)	Weighted Pop Average Unpaid Work	F/M Unpaid Work Ratio	Social & Health Spending	GDP *per capita*	Pop. Avg. Total Edu.	F/M Total Edu. Ratio	Sanitation, % with access	F/M Employment Ratio	Employment to Pop. Ratio
Under-5 Mortality Rate	1.00											
Unpaid Work (Female)	-0.12	1.00										
Unpaid Work (Male)	-0.59	0.10	1.00									
Weighted Pop. Average Unpaid Work	-0.47	0.76	0.72	1.00								
F/M Unpaid Work Ratio	0.73	0.05	-0.83	-0.51	1.00							
Social & Health Spending	-0.60	-0.09	0.66	0.39	-0.59	1.00						
GDP *per capita*	-0.46	-0.29	0.45	0.04	-0.46	0.41	1.00					
Pop. Avg. Total Edu.	-0.76	-0.08	0.72	0.42	-0.77	0.63	0.44	1.00				
F/M Total Edu. Ratio	-0.41	-0.11	0.49	0.23	-0.56	0.28	0.45	0.55	1.00			
Sanitation, % with Access	-0.88	0.18	0.51	0.45	-0.56	0.63	0.50	0.70	0.42	1.00		
F/M Employment Ratio	-0.20	-0.50	0.52	0.02	-0.54	0.35	0.17	0.47	0.35	-0.02	1.00	
Employment to Pop. Ratio	0.13	-0.45	0.04	-0.31	-0.11	-0.28	0.28	-0.11	0.15	-0.32	0.52	1.00

The correlation matrix supports previously described hypotheses regarding the relationships between the reproductive sector, development, and additional control variables. An item of note is the negative correlation between the ratio of female to male unpaid work and social protection spending, linking gender inequality in unpaid work with less governmental social support.

4.6. Results

Results of OLS, 2SLS, and 3SLS models are shown in Table 7. Constant terms in all three stages of the simultaneous equation model were significant. N varies based on the number of countries with available data for all included variables in each model.

Table 7: Econometric Modeling Results

	ln(Under-5 Mortality Rate)						F/M Unpaid Work			F/M Employment				
	OLS	**OLS'**	**2SLS**	**2SLS'**	**3SLS**	**3SLS'**	**OLS**	**3SLS**	**3SLS'**	**OLS**	**2SLS**	**2SLS'**	**3SLS**	**3SLS'**
Constant	15.44*** (3.90)	14.01*** (3.74)	21.88*** (3.85)	16.95*** (3.18)	22.32*** (3.51)	22.15*** (5.82)	15.06*** (3.65)	19.02*** (1.84)	16.91*** (1.79)	8.10*** (2.06)	0.73*** (0.27)	0.73*** (0.27)	5.70*** (1.14)	4.69*** (1.24)
ln(Average Female Unpaid Work)	-0.81 (0.61)		-1.98*** (0.66)		-2.07*** (0.61)									
ln(Average Male Unpaid Work)	0.44** (0.21)		0.93*** (0.29)		1.16*** (0.27)									
ln(Weighted Pop. Avg. Unpaid Work)		-0.29 (0.49)		-0.58 (0.44)		-0.80 (0.60)								
F/M Unpaid Work Ratio		-0.09 (0.07)		-0.18** (0.07)		-0.41** (0.16)				-0.07*** (0.01)	-0.05*** (0.01)	-0.05*** (0.01)	-0.10*** (0.01)	-0.11*** (0.01)
Employment to Pop. Ratio (15+ pop.)	0.01 (0.01)	0.01 (0.01)	0.02*** (0.01)	0.03*** (0.01)	0.02*** (0.01)	0.02** (0.01)								
F/M Employment Ratio	-2.09*** (0.46)	-1.60*** (0.36)	-4.17*** (0.93)	-3.80*** (0.89)	-4.79*** (0.95)	-4.79*** (1.10)	-5.58*** (1.45)	-10.07*** (1.04)	-9.61*** (1.06)					
ln(Pop. Avg. Total Edu.)	-0.54** (0.23)	-0.68** (0.29)	-0.21 (0.34)	-0.23 (0.43)	-0.15 (0.30)	-0.78* (0.48)								
F/M Total Edu. Ratio										0.04 (0.23)	0.15 (0.24)	0.15 (0.24)	-0.14 (0.11)	-0.11 (0.11)
ln(Social & Health Spending as % GDP)							-0.68 (0.52)	-0.49* (0.28)	-0.54* (0.28)	0.06 (0.04)	-0.02 (0.04)	-0.02 (0.04)	-0.02 (0.03)	-0.03 (0.03)
ln(Sanitation, % with Access)							-1.48* (0.86)	-1.77*** (0.41)	-1.33*** (0.40)					
ln(GDP *per capita*)	-0.87*** (3.90)	-0.80*** (0.09)	-1.09*** (0.13)	-0.95*** (0.11)	-1.16*** (0.13)	-1.06*** (0.14)				-1.47*** (0.41)			-0.87*** (0.22)	-0.66*** (0.24)
ln(GDP *per capita*)^2										0.07*** (0.02)			0.04*** (0.01)	0.03*** (0.01)
	N = 58	N = 58	N = 58	N = 58	N = 57	N = 57	N = 60	N = 57	N = 57	N = 58	N = 58	N = 58	N = 57	N = 57

Note: Values in parentheses are robust standard errors for OLS and standard errors for 3SLS. * denotes significance at the 90% confidence level, ** denotes significance at the 95% confidence level, and *** denotes significance at the 99% confidence level. R^2 is an unreliable metric of fit in simultaneous equation models, and is therefore not included here, following the convention of Seguino (2011)

OLS models indicate significant effects on under-five mortality from the amount of unpaid work by men, gender equality in employment, population education, and GDP *per capita*. Higher under-five mortality rates are associated here with greater unpaid work performed by men, greater gender inequality in employment, and lower education and GDP *per capita*. In the alternative OLS model estimating under-five mortality rates, gender equality in employment, population education, and GDP *per capita* remain significant with the same implications as in the traditional OLS equation, with no other additional significant effects. In the instrumented versions of these estimations, gender equality in employment and GDP *per capita* maintain their significance and direction. Population employment rate is also significant, though with minimal effects. Additionally, amounts of both female and male unpaid work are significant in the traditional instrumented measure (2SLS), with female unpaid work improving (decreasing) the under-five mortality rate, and male work worsening (increasing) this. In the alternative instrumented estimation (2SLS'), gender inequality in unpaid work is negatively associated with under-five mortality, suggesting that greater gender equity in unpaid work results in negative child mortality outcomes. The population average amount of unpaid work was not found to be significant. In both instrumented models, gender equality in unpaid work is the only significant instrumented variable.

The OLS model predicting gender equality in unpaid work revealed significant effects of gender equality in employment and access to improved sanitation facilities. In this estimation, gender inequality in unpaid work is associated with greater gender inequality in employment and lower rates of improved sanitation access. In predicting

gender equality in employment, gender equality in unpaid work, GDP *per capita*, and GDP per capita squared were found to be significant. This regression showed employment and unpaid work becoming more gender equal together (an inverse relationship in this model), and a U-shaped relationship between gender equality in employment and GDP *per capita*.

The amount of unpaid work by both women and men, employment rate, gender equality in employment, and GDP *per capita* have significant effects on under-five mortality rate in the 3SLS model. Higher under-five mortality is associated here with lower amounts of unpaid work by women, greater amounts of unpaid work by men, a lower (i.e., less gender-equal) employment rate, lower GDP *per capita*, and minimal, though significant effects of higher employment rates. The greatest effects are seen in the gendered ratio of employment and amounts of unpaid work performed by females, suggesting that countries with higher under-five mortality rates have greater equality in paid and unpaid work. The second stage of this model shows significant effects on gender equality in unpaid work from social and health spending, gender equality in employment, and access to improved sanitation facilities. Greater gender inequality in unpaid work (a higher female-to-male ratio) is associated with lower social and health spending, less equal employment (a lower female-to-male ratio), and less access to improved sanitation, with gender equality in employment having the strongest effect. The third stage of this model reveals impacts on gender equality in employment from gender equality in unpaid work, GDP per capita, and GDP per capita squared. A U-shaped relationship with GDP

per capita is found here, as expected from previous findings such as those of Çağatay & Özler (1995).

Turning to the 3SLS' model, effects of population employment, gender equality in employment, and GDP *per capita* on under-five mortality rates are similar to the 3SLS model. Under-five mortality rates are also significantly affected here by gender equality in unpaid work and average population education. Higher under-five mortality rates are associated with greater gender equality in unpaid work and lower education. Significant effects from Stage 2 and 3 of the 3SLS' model are similar to the 3SLS model.

A robustness check was performed using the models fit for this dataset on the data sample of twenty-nine countries harmonized by the OECD and MTUS databases described in section 4.1.1. All coefficient signs (+/-) were consist between the two datasets, with the exception of independent variables in the first stage of the 3SLS' model (estimating under-five mortality) and gender equality in education in the third stage of the 3SLS and 3SLS' models, predicting gender equality in employment (though this variable was non-significant in the case of both datasets; see Appendix). Despite the general consistency in coefficient signs, significant variables differed between the two datasets in every model. As the 3SLS' model contained major differences in both coefficient signs and significance levels, this model is likely not a reliable fit outside the UNDP dataset. Consistent in coefficient sign and significance across the 3SLS model, however, were a positive effect of male unpaid work on child mortality (increasing mortality with greater amounts of work), a negative effect of GDP *per capita* on development, a negative influence of gender equality in employment on development and also on gender

inequality in unpaid work, and conversely, a negative influence of gender inequality in unpaid work on gender equality in employment. Differences in significant variables between datasets may be related to a higher level of development in the OECD and MTUS databases than in the UNDP sample.

4.7. Discussion

The 3SLS models revealed a complex relationship between gender equality in the reproductive sector and development. As predicted, inequality in unpaid work has an interdependent relationship with gender equality in employment. Average amounts of female and male unpaid work are significant in the 3SLS models and instrumented OLS models, suggesting that greater gender equality in unpaid work leads to higher rates of child mortality. As this is counter-intuitive to our hypothesis, the result must be considered further. The negative (though non-significant) coefficient of the weighted population average amount of unpaid work suggests that more care work may lead to better child health outcomes (e.g., a lower under-five mortality rate), which is also evident from previous studies of the benefits of care work to infants (e.g., Berger, Hill, & Waldfogel, 2005; Tanaka, 2005). As women perform the majority of unpaid work in every country studied here, the effects of women's unpaid work may indeed have a greater impact on the wellbeing of children. However, we would also expect the same from men's unpaid work, which is not found in these models, including the sample of more developed countries used as a robustness check. An explanation for the positive (i.e., detrimental) effects of men's unpaid work on child mortality may have more to do with the greatly skewed gender balance of unpaid work than the quality of the relatively

small average amounts of unpaid work performed by men. This theory is further supported by the significance of gender equality in unpaid work in the instrumented OLS' equation, but non-significance of population average amount of work. Additionally, men's unpaid work may replace other contributions that could benefit children's health (for example, men's participation in paid employment, which may yield greater returns for a household than women's if payment or opportunity for employment is uneven between genders).

The significant two-way inverse relationship between gender equality in employment and unpaid work in Stage 2 and 3 of the 3SLS model was expected based on the conceptual model in Figure 2. Notably, our findings indicate that gender equality in employment and unpaid work affect one another, but that this does not occur as an even exchange across the two factors. This finding was consistent in our modeling of the OECD and MTUS database sample as well. Gender equality in unpaid work had a fairly small influence in Stage 3 of the 3SLS models (coefficients -0.10 and -0.11 in the 3SLS and 3SLS' models, respectively), suggesting low levels of influence on gender equality in employment. In contrast, equality in employment had the largest influence on gender equality in unpaid work in the 3SLS models, excluding constant term coefficients, signifying strong impacts on the gendered division of unpaid work. This finding supports the previous conclusions of Seguino (2013) that economic equality supports greater bargaining power for women at the household level, and of Bittman et al. (2003), who suggest that equality in household work increases as pay becomes more equal between spouses.

As predicted, social protection and health spending showed significant influence on equality in unpaid work in the 3SLS models. This finding suggests that the public side of the reproductive sector is an important factor in promoting gender equality in the private side of the reproductive sector. This also supports the importance placed on the protection of social programs that serve largely female populations, particularly in times of need such as during times of austerity (e.g., Pearson & Elson, 2015). The general lack of significance of social protection and health spending in the models of OECD and MTUS database surveys suggests that this factor may be more significant in less developed countries, which would require further study to confirm.

The diversity of inequalities that can compound one another varies both within and between countries, and although some trends persist on a more global scale, the experiences of men and women are not universal. Fisher & Naidoo (2016), for example, find that household-level data on gender inequality reveals heterogeneity in wealth inequality within countries, which is not captured in national-scale statistics. While studying gender inequality at the national level leaves out important sub-national inequalities, this scale remains an important backdrop for study, particularly due to the political levers that exist at this level. Additionally, for issues such as government spending, sub-nationally disaggregated data is limited and likely to be incomparable between countries. For these reasons, we limit our analysis to the national scale.

Further modeling with subsets of countries by income group may yield additional insight into the role of development, but would likely require additional collection of survey data, particularly from poorer countries. Increased use of time-use survey may

continue to benefit women and others that partake in non-market work by drawing attention to the effort required to support others, such as through care work.

4.8. Conclusion

Our analysis of gender equality in the reproductive sector focuses largely on this sector's relationship with economic development. The need for such a study is evident when observing the reality that average amounts of time spent doing unpaid work by women was higher than men in every country studied, regardless of economic development. While some convergence of average unpaid work is observable in countries with high economic development, the reasons for this remain understudied. However, our findings indicate that rather than focusing on reducing overall burdens of unpaid work for women and men, enhancing women's economic bargaining power is a more effective strategy in promoting gender equality in the reproductive sector. Our finding that gender equality in employment and in unpaid work have positive effects on one another supports prior evidence that macroeconomic development and gender equality are deeply linked. However, as evidenced by the complex relationship of GDP *per capita* and gender equality in employment, infinite growth in any area of an economy is not guaranteed to result in egalitarianism.

In targeting gender equality in both paid and unpaid work through policy mechanisms, it may be beneficial to tackle both sides of the equation at once. Policies targeting enhanced economic bargaining power for women, such as support for women's employment through affirmative action and similar programs, as suggested by Seguino, (2013), could serve as a strategy for directly increasing equality in employment and

indirectly increasing equality in unpaid work. Promoting changes to gender norms and expectations surrounding unpaid work, such as through the implementation of paternity leave policies, may also have positive effects on gender equality in employment, and in the long run, development.

Effects of social and health spending on equality in unpaid work and development in our models suggest that social spending may improve women's wellbeing either through provisioning that either increases men's time in unpaid work, decreases women's time, or both. Further study is required to fully understand this relationship between the public and private sector of reproduction, but our finding indicates that public support for unpaid workers will have positive outcomes to gender equality in unpaid work, and indirectly, on development.

By targeting social support and bargaining power as means of achieving gender equality, the long-run and short-run effects of the reproductive sector on development may be better addressed. It is clear from our findings that increased participation in unpaid labor by men alone is not adequate to break down the gender norms and expectations that shape divisions of labor. A two-pronged approach toward gender equality in paid and unpaid labor, with adequate social support, may address this issue, with particular attention to the factors shaping men's and women's participation (or lack thereof) in employment and in the reproductive sector.

4.9. Appendix

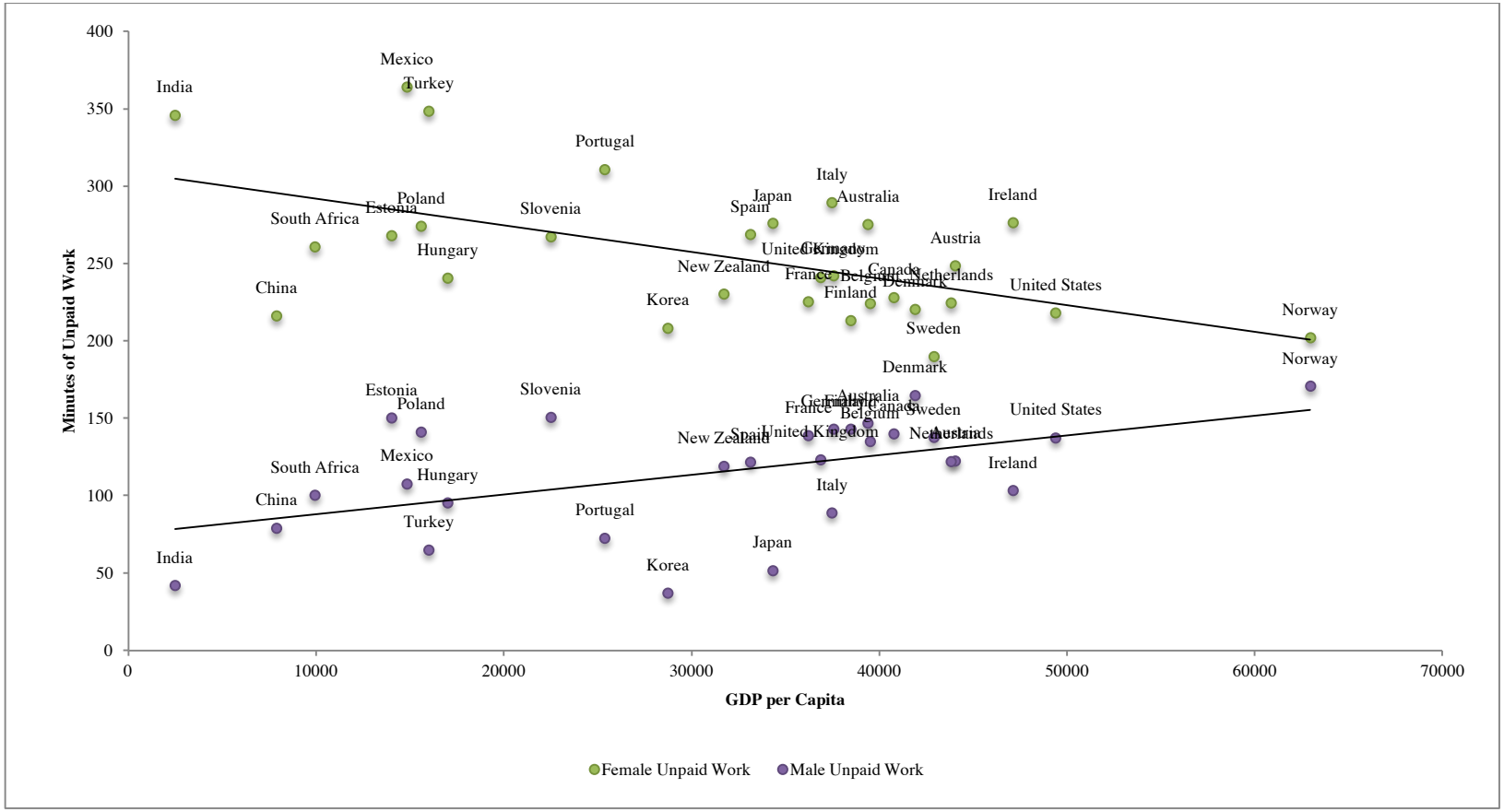


Figure 6: Average amounts of unpaid work by men and women, OECD and MTUS data group (N = 28, not pictured: Qatar)

Table 8: Summary Statistics for OECD and MTUS database sample

Variable	Obs	Mean	Std. Dev.	Min	Max
Under-5 Mortality Rate	29	12.72	20.85	3.10	94.80
Unpaid Work (Female)	29	254.95	44.38	189.88	364.04
Unpaid Work (Male)	29	115.36	36.19	37.01	170.49
Weighted Pop Avg Unpaid Work	29	186.14	21.58	122.97	236.44
F/M Unpaid Work Ratio	29	2.65	1.65	1.18	8.28
Social & Health Spending as % GDP	29	19.65	8.01	1.61	32.07
GDP *per capita*	29	31437.09	14358.64	2471.49	62945.99
Population Avg. Total Education	29	10.25	1.84	5.03	13.18
F/M Total Education Ratio	29	0.95	0.09	0.61	1.08
Sanitation, % with Access	28	92.14	16.64	24.60	100.00
F/M Employment Ratio	29	0.74	0.13	0.34	0.90
Employment to Population Ratio (15+ Population)	29	55.20	7.02	41.20	68.50

Table 9: Correlation Matrix, OECD and MTUS database sample (N = 28)

	Under-5 Mortality Rate	Unpaid Work (Female)	Unpaid Work (Male)	Weighted Pop. Avg. Unpaid Work	F/M Unpaid Work Ratio	Social & Health Spending as % GDP	GDP *per capita*	Pop. Avg. Total Edu.	F/M Total Edu. Ratio	Sanitation, % with Access	F/M Employment Ratio	Employment to 15+ Pop. Ratio
Under-5 Mortality Rate	1.00											
Unpaid Work (Female)	0.45	1.00										
Unpaid Work (Male)	-0.43	-0.46	1.00									
Weighted Pop Avg. Unpaid Work	0.05	0.64	0.38	1.00								
F/M Unpaid Work Ratio	0.60	0.61	-0.90	-0.15	1.00							
Social & Health Spending as % GDP	-0.67	-0.48	0.56	0.01	-0.62	1.00						
GDP *per capita*	-0.63	-0.56	0.51	-0.14	-0.54	0.68	1.00					
Pop. Avg. Total Edu.	-0.71	-0.64	0.51	-0.20	-0.61	0.50	0.65	1.00				
F/M Total Edu. Ratio	-0.64	-0.48	0.56	0.02	-0.73	0.43	0.49	0.76	1.00			
Sanitation, % with Access	-0.94	-0.43	0.46	-0.01	-0.61	0.72	0.65	0.74	0.63	1.00		
F/M Employment Ratio	-0.53	-0.82	0.68	-0.27	-0.79	0.51	0.53	0.67	0.73	0.49	1.00	
Employment to Pop. Ratio (15+ pop.)	-0.24	-0.35	0.15	-0.27	-0.13	-0.06	0.39	0.25	0.15	0.04	0.45	1.00

Table 10: Econometric Modeling Results, OECD and MTUS dataset sample

	ln(Under-5 Mortality Rate)						F/M Unpaid Work			F/M Employment				
	OLS	**OLS'**	**2SLS**	**2SLS'**	**3SLS**	**3SLS'**	**OLS**	**3SLS**	**3SLS'**	**OLS**	**2SLS**	**2SLS'**	**3SLS**	**3SLS'**
Constant	14.44*** (3.81)	15.62*** (4.93)	18.99*** (6.64)	29.2** (11.09)	17.21*** (5.33)	***-23.26 (30.76)***	10.92*** (1.6)	14.42*** (3.84)	11.27*** (3.73)	**4.70 (3.27)**	0.45* (0.25)	0.45* (0.25)	3.67* (2.01)	4.17** (2.12)
ln(Average Female Unpaid Work)	-0.35 (0.47)		**-1.24 (1.11)**		**-0.91 (0.87)**									
ln(Average Male Unpaid Work)	0.42** (0.16)		0.72* (0.38)		0.60** (0.3)									
ln(Weighted Pop Avg Unpaid Work)		-0.11 (0.59)		-1.93 (1.55)		***3.63 (3.8)***								
F/M Unpaid Work Ratio		**-0.13* (0.06)**		-0.50* (0.27)		***1.14 (0.81)***				-0.04** (0.02)	-0.05*** (0.01)	-0.05*** (0.01)	-0.07*** (0.01)	-0.07** (0.03)
Employment to 15+ Pop. Ratio	0.00 (0.02)	0.00 (0.02)	**0.01 (0.02)**	**0.03 (0.02)**	**0.00 (0.01)**	***-0.05 (0.04)***								
F/M Employment Ratio	**-1.48 (1.58)**	**-1.56 (1.51)**	**-3.86 (2.38)**	-7.67* (4.13)	-3.12* (1.77)	***9.04 (8.14)***	-7.88*** (1.51)	-10.31*** (1.44)	-7.49*** (1.66)					
ln(Pop. Avg. Total Edu.)	**-0.69 (0.70)**	**-0.76 (0.71)**	-0.3 (0.76)	-0.06 (0.98)	-0.4 (0.63)	***0.00 (0.9)***								
F/M Total Edu. Ratio										**0.64** (0.28)**	**0.49** (0.23)**	**0.49** (0.23)**	*0.28 (0.19)*	*0.39 (0.34)*
ln(Social & Health Spending as % GDP)							-0.04 (0.04)	**-0.43 (0.5)**	-1.07** (0.45)	**0.01 (0.07)**	-0.02 (0.03)	-0.02 (0.03)	-0.01 (0.04)	-0.03 (0.06)
ln(Sanitation, % with Access)							**-0.02 (0.02)**	**-0.64 (1.09)**	**0.00 (1.04)**					
ln(GDP *per capita*)	-0.95*** (0.12)	-0.96*** (0.13)	-1.02*** (0.2)	-1.14*** (0.26)	-0.98*** (0.17)	***-0.08 (0.45)***				**-0.91 (0.69)**			**-0.59 (0.42)**	**-0.71 (0.47)**
ln(GDP *per capita*)^2										**0.05 (0.03)**			**0.03 (0.02)**	**0.04 (0.02)**
	N = 29	N = 29	N = 29	N = 29	N = 28	N = 28	N = 28	N = 28	N = 28	N = 29	N = 29	N = 29	N = 28	N = 28

Note: Values in parentheses are robust standard errors for OLS and standard errors for 3SLS. * denotes significance at the 90% confidence level, ** denotes significance at the 95% confidence level, and *** denotes significance at the 99% confidence level. Bold font indicates differing significance from the UNDP dataset; italic font indicates a differing sign (+/-) from the UNDP dataset. R^2 is an unreliable metric of fit in simultaneous equation models, and is therefore not included here, following the convention of Seguino (2011).

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CHAPTER 5: MATERNAL HEALTH CAMPAIGNS IN INTERNATIONAL DEVELOPMENT AGENDAS: TOWARD A SOCIO-ECOLOGICAL APPROACH

5.1. Abstract

In recent decades, reducing maternal mortality rates has become part of the international development agenda, including incorporation in the United Nations Millennium Development Goals (MDGs). However, of the eight main goals, improving maternal health was the least achieved during the 1990 to 2015 commitment period. Renewed efforts to reduce maternal mortality through the Sustainable Development Goals signal a shift toward including environmental factors affecting women's health and sustainable practices needed to address them. To investigate this comparative lack of progress and proposals to accelerate achievement, we first discuss maternal health as an international development goal, with particular focus on maternal mortality outcomes during the MDG period. Potential factors contributing to success or failure in achieving national targets are then examined. Recommendations for a socio-ecological approach to addressing the SDG maternal health goal are offered, with particular focus on threats of climate disruption to the most vulnerable members of society.

5.2. Introduction

Maternal health is a global concern affecting millions of women, their families, and communities every year. Maternal conditions before, during, and after the birth of a child are the number one cause of death among women globally (UN Statistics Division 2015) with 303,000 deaths reported from maternity related causes in 2015, over 99 percent of which occurred in developing regions (WHO, 2015d, 2016). Figure 7

highlights the global distribution of maternal mortality rates, averaging 230 maternal deaths per 100,000 live births in developing countries, and 16 maternal deaths per 100,000 live births in developed countries (WHO, 2014). Maternal mortality has been recognized as both a consequence of poverty, but also a cause (Izugbara & Ngilangwa, 2010; Ronsmans & Graham, 2006). However, poverty alleviation alone, for example through increasing household income, does not necessary reduce maternal mortality rates given gendered differences in access to health care, agency over female health choices, and other disparities in power and decision making (Filippi et al., 2006; Ronsmans & Graham, 2006).

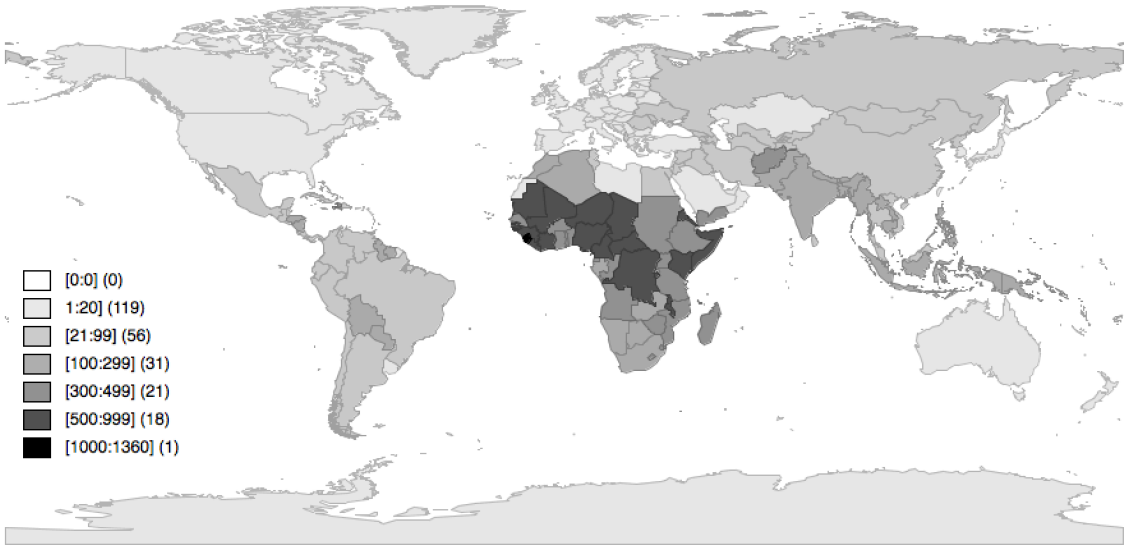

Figure 7: Global Maternal Mortality Rates (WHO, 2015d)

In recognition of the unique challenges of improving maternal health and its importance to poverty alleviation more broadly, in 2000 the United Nations (UN) included maternal health as one of eight high level Millennium Development Goals (MDGs). The eight MDGs were put forth through a consensus process by the 189 UN

member states as an agenda to achieve by 2015. Despite some successes, not all goals were met, including targets to decrease maternal mortality rates worldwide by 75 percent between a 1990 baseline and 2015 (MDG 5A). While maternal health improved at the global scale by 45 percent during the commitment period, this remains the least achieved MDG (World Bank, 2015a). Many in the global health community have been skeptical that targets could be reached through the methods employed by lead agencies, particularly given a burden of maternal health risks in developing countries that is fifteen times greater than developed areas (World Bank, 2015a). Bhutta et al. (2010), for example, found uneven progress toward the maternal health goals across sixty-eight countries, with greater need for improvement in areas such as family planning, skilled delivery, and care in antenatal, emergency obstetric, and postnatal conditions.

In response to the changing agenda of the UN and the end of the MDG campaign in 2015, the Sustainable Development Goals (SDGs) were created in order to update and revise global development programs through 2030. While the SDGs represent a next wave of challenges, they also address many of the same goals that were included in the MDGs, including maternal health. This unmet MDG is now addressed in SDG Goal 3, to "ensure healthy lives and promote well-being for all at all ages," with a global target of less than 70 maternal deaths per 100,000 live births by 2030 (Global Health 2035, 2014). To achieve this level, the global maternal mortality rate must drop by 7.5 percent annually, more than three times the rate of decline that occurred during the MDG period (WHO, 2015d).

The premise of this paper is that if the SDGs related to maternal health are to be more successful than their previous incarnations, they must not only be re-conceptualized, but also addressed in novel ways. This includes a need for integration of other major issues and lens, such as sustainability, along with traditional approaches that tend to be isolated as social issues, overlooking important factors outside of this silo including ecological contexts. The SDGs signal an effort to address major issues through an expanded socio-ecological lens, moving toward an overarching goal of sustainability across development goals, rather than as a separate agenda item. Here, we review the progress of maternal health during the MDG period, looking particularly at countries with high maternal mortality rates. We also consider the new challenges being faced in the SDG period, and how these will impact the more aggressive maternal health target set by the Sustainable Development Agenda. Determining how certain countries were successful or unsuccessful in the MDG's maternal health goal, and whether this indicates progress toward a healthy and sustainable situation for women, can help elucidate issues related to resilience and sub-national inequities.

5.3. Maternal Health and International Development Goals

Maternal health has been considered as an international development priority since the mid-1980s, spurred by the UN Decade for Women, and coming to fruition as a World Bank, WHO, and the Global Safe Motherhood Initiative sponsored by the UN Population Fund in 1987 (Shiffman & Smith, 2007). Maternal health has traditionally been considered a social or economic issue, with maternal mortality rates affected by income, urban or rural home location, national development level, age during pregnancy,

preexisting health conditions, and number of pregnancies (WHO, 2014). Although maternal mortality is linked closely with economic poverty, previous attempts in promoting health through a focus on economic inequity alone have not reduced mortality rates at the targeted pace. This is particularly crucial to consider in the context of women's health issues, as poverty and gender inequality are deeply linked (Filippi et al., 2006). Maternal mortality can also compound other problems, with higher mortality associated with lower school enrolment for children of both genders, but particularly for girls (Cooray & Klasen, 2014).

Before the development of the MDG strategy, many countries had already reduced maternal mortality through a number of social and political interventions, including a rise in professional midwifery, improved hospital care and access, improved surgical techniques, decreased pathogen virulence related to sepsis, and less restrictive abortion laws (Ronsmans & Graham, 2006). For example, in Finland maternal mortality in 1936 was estimated at 543 deaths per 100,000 live births (Roser, 2015). The following year, a maternity grant program began to support low-income mothers, and by 1949 was extended to all mothers (Social Insurance Institution of Finland, 2015). Today, Finland has some of the lowest rates of infant and maternal mortality in the world, estimated at three deaths per 100,000 live births (WHO, 2015b). The maternal grant program still provides all expectant mothers in Finland a package of basic items for their newborn, including a box to be used as a crib, winter and summer clothing, and diapers.

Other countries considered developed today also experienced steep reductions in maternal mortality following national-level legislative and social efforts. Countries in

Western Europe, Scandinavia, North America, and Oceania saw major drops in maternal mortality rates beginning in the late 1930s through both technical and political interventions, including improved data availability, access to professional obstetric care, public awareness and commitment to healthcare improvements, and cultural conditions that valued healthcare (De Brouwere, Tonglet, & Van Lerberghe, 1998). A steep decline in rates in several developed countries beginning in 1937 has been particularly attributed to care provided by birth attendants (Loudon, 2000).

Despite impressive progress toward healthy childbirth in now developed regions, many countries continue to suffer from extremely high maternal mortality rates. By 1990, ninety-five countries still had maternal mortality rates higher than 100 per 100,000 live births, with twenty countries at over 1,000 per 100,000 live births (WHO, 2015d). Issues such as women's empowerment, autonomy, and access to reliable care appeared at the forefront of maternal mortality research and discussions. Thaddeus and Maine (1994), for example, found that in several African and Asian countries, the decision for a woman to seek care when facing health complications related to pregnancy and childbirth is not made by her, but by other members of her family or community. In addition to issues of gender inequality, countries in conflict have struggled to reach development goals due to the inherent instability and suffering associated with social upheaval (Stewart, 2003). In light of concern for maternal health as a gendered public health issue, experts have called for political efforts targeting overarching problems including poverty, education, debt, and macroeconomic development (see Harrison 1997; Okonofua 1997; and Logie and Rowson 1998).

As international organizations moved toward highlighting such intertwined social concerns through international development agendas, maternal health became an obvious choice as a metric of success, including the high profile Millennium Development Goals (MDGs). The UN Millennium Declaration, signed by 189 UN member countries in 2000, sought to address widespread issues of inequality through four major elements at the global and country levels: monitoring, analysis, campaigning and mobilization, and operational activities (UN 2002). The MDGs grew out of this Declaration through a decision-making process led by several developed countries, including the US, Japan, and several European countries (Fehling et al. 2013). MDG 5, Improve Maternal Health, had two sub-goals: (5A) reduce by three quarters, between 1990 and 2015, the global maternal mortality rate and (5B) achieve universal access to reproductive health by 2015.

The baseline for the commitment period was pinned at 1990, when the global maternal mortality rate was 385 deaths per 100,000 live births, with large disparities between developed and developing countries, ranging from averages of twenty-three to 430 deaths per 100,000 live births (WHO, 2015d). By 2015, the global rate had declined to 216 deaths per 100,000 lives births, ranging from twelve to 239 deaths per 100,000 lives births in developed and developing regions (WHO, 2015d). Maternal health interventions largely focused on improving medical conditions such as increasing the presence of skilled birth attendants (Yamin and Boulanger 2014; UN 2015). Systemic changes to reproductive policies and wealth distribution were also targeted as known strategies to improve maternal health, with strategic investment as a key factor (Freedman et al. 2005; Filippi et al. 2006).

While the global maternal mortality rate did decline during the MDG commitment period, individual country improvements varied widely, and no single region achieved the 75 percent reduction goal by 2015 (WHO, 2015d). Figure 8 plots percentage declines for the ninety-five target countries (selected for having maternal mortality rates above 100 deaths per 100,000 live births in 1990). Only nine of the target countries achieved MDG 5A by 2015: Bhutan, Cabo Verde, Cambodia, Iran, Lao PDR, Maldives, Mongolia, Rwanda, and Timor-Leste (WHO, 2015c). Thirty-nine additional countries were determined to be "making progress" toward the target, according to the WHO (WHO, 2015c). However, the remaining forty-seven countries made insufficient or no progress.

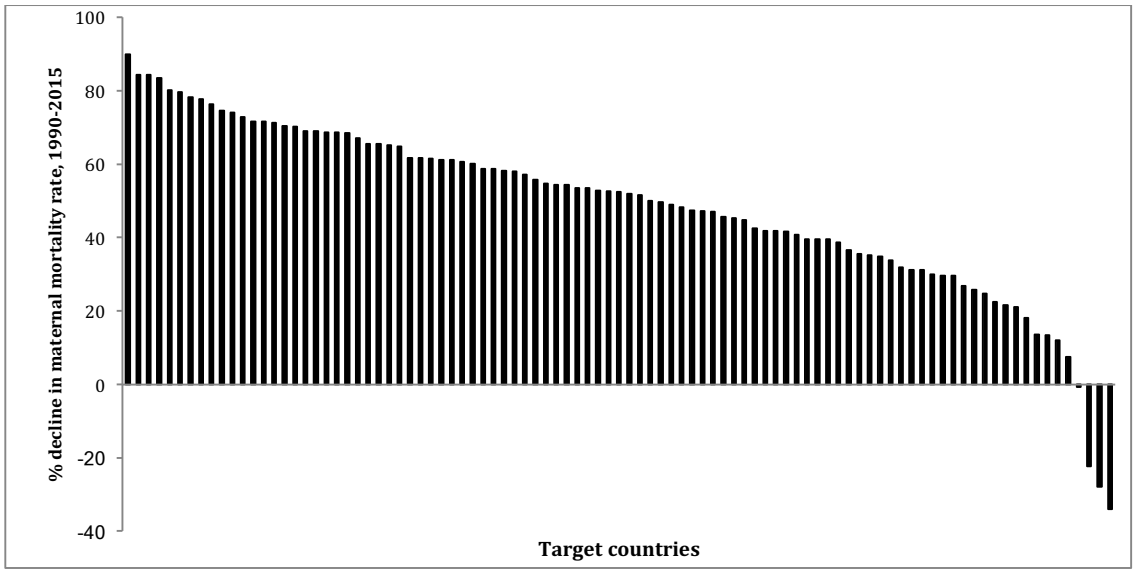

Figure 8: Percent decline in maternal mortality rate point estimates for ninety-five targeted countries, 1990-2015 (data source: WHO 2015d)

Analysis of the successes and failures of the MDG agenda and approach to maternal health begins with a series of general critiques. The MDGs as a whole have been criticized for setting immeasurable goals with inadequate data sources, overlooking crucial aspects of poverty and social dynamics that result in suffering, and perpetuating

unjust power dynamics in governance (Attaran 2005; Bond 2006; Ronsmans and Graham 2006; Fukuda-Parr and Hulme 2011; Fehling, Nelson, and Venkatapuram 2013). Beyond these concerns, the omission of crucial issues such as non-fatal maternal health issues and combatting violence against women are especially concerning for the issue of maternal health (Ronsmans & Graham, 2006). As the least achieved MDG, the maternal health targets are particularly vulnerable to critiques related to data availability, questionable target metrics, and political interference.

Unreliable data has resulted in uncertainty intervals for maternal mortality estimates with ranges wide enough to offer inconclusive results. Figure 9 highlights WHO figures on uncertainty surrounding maternal mortality rate point estimates, demonstrating high variability in data in countries with the lowest levels of improvement. While large uncertainty intervals are not necessarily indicative of poor quality data, they do imply some variation between data sources. Abalos et al. (2013), for example, suggest that uncertainty intervals in their review estimates of preeclampsia and eclampsia likely indicates regional variation as well as variability in data quality between countries and regions.

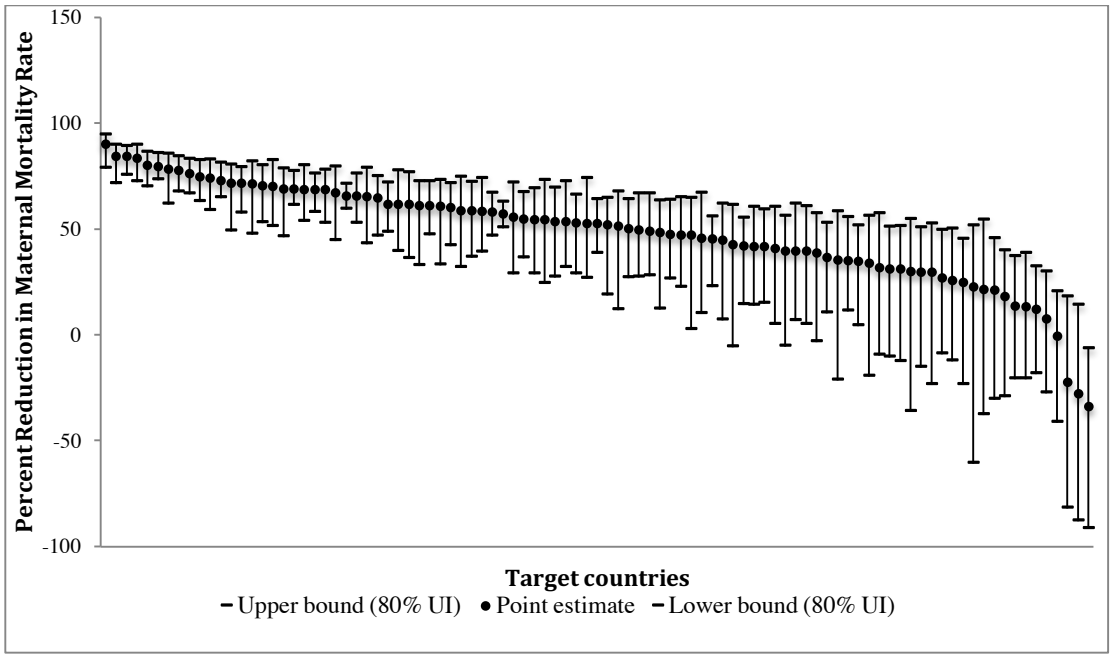

Figure 9: Percent reduction in maternal mortality rate (1990-2015), point estimates with 80 percent uncertainty intervals for ninety-five MDG target countries (data source: WHO, 2015d)

The objectives of the MDG targets have also been questioned for being too ambitious for a twenty-five year period, as well as somewhat biased against lower-income countries (Clemens, Kenny, & Moss, 2007; Easterly, 2009). Additionally, the boundary years of the period of reduction can be considered fairly arbitrary. For example, data from the *Trends in Maternal Mortality* report shows that of the nine successful countries, five had achieved more than a 50 percent reduction from their 1990 goals by the time the MDGs were adopted, with Maldives having already achieved the targeted 75 percent drop (WHO, 2015d). By starting with 1990 figures on maternal mortality (particularly for countries in unstable political settings), rather than with 2000 figures, far greater percentage reductions were seen in these countries. In fact, none of the nine "achieved" countries would have reached a 75 percent target if the observation period had started in 2000.

The national-level scale of the target has also been accused of overlooking inequalities at local and regional levels. For example, maternal mortality in the United States rates declined steeply for the population as a whole between 1935 and 1970, but major disparities in maternal mortality continued beyond this time period between racial, geographical, and socio-economic groups. One example of this is seen in childbirth-related death, which was 2.7 times more likely for black women than white women in 2007 (Singh, 2010). Public health experts recommend targeting the rampant inequalities in maternal health care at the sub-national level, particularly focusing on rural and poor populations, providing increased access to skilled healthcare, and intrapartum strategies including family planning and safe abortion options (Filippi et al., 2006; Ronsmans & Graham, 2006).

Political interference has also been identified as an underappreciated barrier to reaching maternal mortality rate targets within the MDG framework, particularly with respect to the exclusion of universal reproductive health services, which was opposed by an alliance of the Vatican and several conservative Islamic states (Fukuda-Parr & Hulme, 2011). As a result, several other areas critical to the maternal health were neglected in the MDG agenda, including provision of contraceptives, safe abortion options, and the treatment of HIV/AIDS as a reproductive issue (Yamin & Boulanger, 2014). The question of just decision-making has also been raised with respect to the MDG decision-making process, including reproach for the lack of developing-country stakeholders, the omission of previously agreed upon development goals, and the unequal power of several

developed countries and regions in the shaping of the Millennium Agenda (Fehling et al., 2013).

In recent years there has been a call to expand the focus of the UN's development agenda beyond strictly social factors, including a new concern for threats posed by climate-related disruption. This movement extends beyond the realm of maternal health, appealing to the notion of interconnectedness of social and environmental systems. However, the strength of sustainability advocated by the new SDGs is still largely open to interpretation and yet to be seen in practice. Additionally, the traditionally social framework of maternal health goals must not simply add environmental metrics without fully integrating these realms. If the SDGs are to be successful, they must address sustainability not just in terms of conservation and resource management, but also in the sense of sustaining health and safety in times of crisis. Given this multitude of challenges faced by international development agendas for the future, it is important to also consider the results of the MDGs as an outgoing agenda, both in spite of and with respect to these criticisms. By delving into the underlying stories of the countries that best and least achieved these goals, future work may be better targeted for reducing maternal mortality.

5.4. Analysis of Maternal Health Progress in the MDG Period

The WHO targeted ninety-five countries for the maternal health goal that began the MDG period with a maternal mortality rate greater than 100 deaths per 100,000 lives births. Table 11 summarizes the WHO categories that describe the change in maternal mortality from 1990 to 2015 for targeted countries (WHO, 2015d). "Success" in reducing maternal mortality does not signal a solved women's health issue, nor does it mean that

these countries are done with this type of international development agenda target. In fact, of the nine countries that "achieved" the MDG goal, five still had maternal mortality rates above the new SDG target of seventy deaths per 100,000 live births in 2015 (WHO, 2015d). Additionally, despite their impressive declines in maternal mortality, only two of these countries, Cambodia and the Maldives, are supported by at least 90 percent statistical confidence in the achievement of the 75 percent reduction goal (WHO, 2015d).

Table 11: WHO categories for 95 targeted countries (WHO, 2015d)

Category	Requirement for 1990-2015 period	Number of Countries	Average Maternal Mortality Rate per 100,000 live births, 2015
Achieved	Maternal mortality rate point estimate reduction of 75% or greater	9	132.22
Making progress	50% or greater point estimate reduction and at least 90% probability of point estimate reduction greater than 25%	39	198.74
Insufficient progress	At least 25% point estimate reduction and at least 90% probability of reduction greater than zero	21	442.90
No progress	Point estimate reductions less than 25%, 90% probability of no reduction in maternal mortality rates, or an increase in maternal mortality	26	411.54

Eight of the nine countries that achieved at least a 75 percent decrease in their maternal mortality rates experienced dramatic governmental changes since 1990. Of the nine, only Iran did not experience large-scale changes in its governmental structure during this period, however, was in a post-conflict period at the start of the MDG period, having suffered extreme health consequences during the Iran-Iraq war (Khateri et al. 2003; Awqati et al. 2009). The Rwandan genocide in 1994 included widespread sexual violence against women (Human Rights Watch, 1996). Nearly a decade later, in 2003,

Rwanda adopted a new constitution that guaranteed at least 30 percent representation by women in national decision-making and changing the political cultural of the country (Devlin & Elgie, 2008). War and isolation also ravaged Cambodia at the start of the MDG phase, ending in 1991, with another brief period of war in 1997. Since then, Cambodia has experienced rapid economic growth, but with major challenges including rising inequality and corruption (Hill & Menon, 2013). War also devastated Timor-Leste during the MDG period, leading up to and following the country's violent independence from Indonesia, and in response to long-term socioeconomic insecurity (Nevins, 2007).

The prevalence of recent conflicts in the most successful countries in achieving maternal health reductions raises the question of whether these countries would have seen such success if they had not been in conflicts in the first place. Were their initially high maternal mortality rates, for instance, inflated by wartime conditions, and was progress toward public health simply a function of restored peace? While it is important to consider change in maternal mortality within a country during the MDG period, it is also critical to assess the overall state of maternal health rather than only countries' percent reductions.

To analyze key factors to success in improving maternal health among the ninety-five target countries, we divided countries into above and below global average groups according to absolute maternal mortality rates achieved by the end of the target period. Of the ninety-five target countries, forty-seven countries had fallen below the global average of 216 deaths per 100,000 live births by 2015, twenty-four of these had dropped below the 100 deaths per 100,000 live births threshold that had previously qualified them

as target countries, and nineteen of these had already dropped below the new SDG target of seventy. Potential contributing factors to these maternal health outcomes were then identified in the final reports of the Demographic and Health Surveys (DHS), funded by the US Agency for International Development (USAID) and implemented by ICF International for the sub-national level. DHS surveys are nationally representative, and include questions regarding maternal health before, during, and after pregnancy (as well as myriad other topics). Environmental variables of access to potable water and sanitation were also gathered from these DHS reports. DHS data is not collected in all countries, thus our sample size was limited to forty-eight countries with data for prenatal care, birth conditions, and environmental variables, and forty-seven countries for post-natal care.

Table 12 lists countries by above and below average groupings. All DHS reports used for this study are available at http://dhsprogram.com/publications/. Only surveys from 2010 through 2015 were considered as outcomes, given the 25-year time frame of the MDG maternal health goal observation. The three stages of childbirth examined are not an exhaustive list of factors that influence maternal mortality; rather, we consider these as bellwether indicators of a health system that supports maternal wellbeing, based on public health literature (Campbell and Graham 2006; Ronsmans and Graham 2006; Bhutta et al. 2010; Paul et al. 2011; Afework et al. 2014). It should be noted that issues including women's choice to become or stay pregnant and their equality in decision-making are not included here, but are also crucial factors for consideration of development agenda priorities.

Table 12: Target countries with DHS data available, above and below the 2015 global average maternal mortality rate (WHO, 2015d; World Bank, 2016a)

	Above Global Average	Below Global Average
Countries	Benin, Burkina Faso, Burundi, Cameroon, Chad, Comoros, Congo, Dem. Rep., Congo, Rep., Cote d'Ivoire, Equatorial Guinea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Haiti, Kenya, Lesotho, Liberia, Malawi, Mali, Mozambique, Namibia, Nepal, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Tanzania, Togo, Uganda, Yemen, Zambia, Zimbabwe	Bangladesh, Cambodia, Colombia, Dominican Republic, Egypt, Honduras, Indonesia, Jordan, Lao, Pakistan, Peru, Philippines, Tajikistan

5.4.1. Prenatal Care

The role of skilled attendants to pregnancy, delivery, and post-natal care has been a focus of the global development agenda's efforts to reduce maternal mortality since early in the MDG period (WHO, 2004). Some have questioned the efficacy of promoting prenatal care on maternal health outcomes, as many harmful conditions are not detectable before birth (for example, Van Lerberghe and De Brouwere 2000). However, others have identified potentially life-saving facets of prenatal care, including early diagnosis of pregnancy complications, education regarding safe birth, and increased use of birthing facilities for delivery (Bergsjø 2000; Bernis et al. 2003; Pervin et al. 2012; David et al. 2014). Despite this evidence, government interventions in some countries have seen little progress in increasing prenatal care, in large part due to individuals' willingness to spend limited household resources on delivery care rather than prenatal treatment (Pathak, Singh, & Subramanian, 2010). Other programs, such as the Janani Suraksha Yojana conditional cash transfer program in India, however, have shown significant increases in prenatal care and use of birth facilities, along with a decrease in maternal and neonatal mortality (Lim et al., 2010).

Table 13 summarizes the most recent DHS data available for target countries since 2010 for the percent of women who received skilled prenatal care during pregnancy (i.e., most recent birth among women with a live birth in the five years preceding the survey), a Wilcoxon-Mann-Whitney rank sum test was performed due to the non-normal distribution of data. This test revealed no significant difference in the percentage of women receiving skilled antenatal care ($z = -0.812$, $p = 0.4167$) between countries above ($N = 35$) and below ($N = 13$) the global average maternal mortality rate.

Table 13: Skilled Prenatal (Antenatal) Care in Select Countries Above and Below the 2015 Average Global Maternal Mortality Rate (DHS Final Report data since 2010)

Country	N	MMR 2015	Report Year	% skilled antenatal care (all)	% skilled antenatal care (rural)	% skilled antenatal care (urban)	% skilled antenatal care (no edu.)	% skilled antenatal care (highest edu. bracket)
Below 2015 global average maternal mortality rate								
Tajikistan	3,601	32	2012	78.8	77.7	82.7	69.4	92.0
Egypt	11,391	33	2014	90.3	89.2	92.8	80.1	94.3
Jordan	6,577	58	2012	99.1	99.2	99.1	98.0	99.7
Colombia	11,062	64	2010	97.0	94.0	98	76.1	99.6
Peru	7,703	68	2014	96.9	91.9	98.9	92.0	99.8
Dominican Republic	2,931	92	2013	99.3	98.5	99.5	95.1	99.1
Philippines	5,188	114	2013	95.4	94.2	96.7	61.5	98.1
Indonesia	14,782	126	2012	95.7	93.3	98.2	64	99.1
Honduras	8,269	129	2011-12	96.6	96.1	97.0	87.6	99.1
Cambodia	6,472	161	2010	89.1	87.6	97.0	76.7	97.5
Bangladesh	4,627	176	2014	63.9	58.6	78.8	39.0	89.4
Pakistan	7,446	178	2012-13	73.1	66.7	87.8	59.9	97.2
Lao	4,306	197	2011-12	54.2	45.9	83.4	23.1	93
	Mean	109.85	2012.4	86.88	84.07	93.07	70.96	96.76
	Std. Dev.	56.79	1.51	14.77	16.87	7.30	21.89	3.44

Above 2015 global average maternal mortality rate								
Zambia	9,324	224	2013-14	95.7	94.0	98.6	90.9	99.3
Nepal	4148	258	2011	58.3	54.9	87.9	42.0	89.0
Namibia	3,842	265	2013	96.6	96.5	96.7	87.7	97.4
Rwanda	6,060	290	2014-15	98.3	98.5	98	97.4	98.5
Gabon	3,702	291	2012	94.7	85.7	96.1	87.8	97.8
Senegal	4200	315	2012-13	94.5	92.1	98.5	92.5	99.1
Ghana	4142	319	2014	97.3	96.2	98.6	94.1	99.9
Comoros	2064	335	2012	92.1	90.9	94.8	89.1	96.4
Equatorial Guinea	1835	342	2011	91.3	89.4	93.3	71.0	95.8
Uganda	4968	343	2011	94.9	94.4	97.4	92.3	96.6
Ethiopia	7764	353	2011	33.9	26.4	76	25.1	90.9
Haiti	5,218	359	2012	90.3	88.7	92.9	80.6	96.5
Togo	4858	368	2013-14	72.7	58.4	96.5	62.2	86.5
Burkina Faso	10487	371	2010	94.9	94.1	98.3	94.1	99.3
Yemen	10,369	385	2013	59.8	51.3	79.9	47.9	93
Tanzania	5519	398	2010	95.9	95.1	98.6	93.5	97.8
Benin	8,993	405	2011-12	85.8	82.1	91.3	81.5	98.4
Congo, Rep.	5,882	442	2011-12	92.6	86.8	95.9	72.7	96.5
Zimbabwe	4,426	443	2010-11	89.8	89.8	89.9	90.4	94.6
Lesotho	2,575	487	2014	95.2	94.2	97.5	83.8	98.7
Mozambique	7874	489	2011	90.6	88.2	96.3	85.5	98.2
Kenya	14,442	510	2014	95.5	94	97.8	82.1	98.6
Niger	8,002	553	2012	82.8	80.4	96.9	80.8	98.8
Mali	6773	587	2012-13	74.2	69.3	93.2	70.7	95.2
Cameroon	7,647	596	2011	84.7	75.6	95.6	60.2	99.2
Malawi	13,664	634	2010	94.7	94.4	96.2	91.5	100
Cote d'Ivoire	5,244	645	2011-12	90.6	86.5	96.7	87.7	97.2
Guinea	4995	679	2012	85.2	80.8	96.3	82.1	97.7
Congo, Dem. Rep.	11,065	693	2013-14	88.4	85.8	94.1	82.3	99.1
Gambia	5,305	706	2013	86.2	84.9	87.5	83.8	89
Burundi	5063	712	2010	98.9	98.9	99.0	98.5	98.2

Liberia	4769	725	2013	95.9	93.4	98.0	93.3	98.3
Nigeria	20,467	814	2013	60.6	46.5	86.0	36.2	97.3
Chad	11140	856	2014-15	63.7	58.8	83.6	51.6	98.8
Sierra Leone	8647	1360	2013	97.1	96.7	98.2	96.3	99.2
	Mean	501.49	2011.92	86.11	82.68	94.06	78.83	96.77
	Std. Dev.	228.00	1.32	14.71	17.28	5.61	18.60	3.30

Note 1: skilled antenatal care refers to care performed by a doctor, nurse, midwife, auxiliary midwife, lady health visitor, Maternal and Child Health Aide, feldsher (mid-level health professional similar to a paramedical practitioner), AMO, clinical officer, assistant clinical officer, physician's assistant
Note 2: Highest level of education differs between surveys, and may refer to post- or more than secondary/grade 12/tertiary; secondary school and higher; higher than post secondary, but non tertiary; or college

However, in exploring antenatal care at the subnational level, it is clear that not all women have benefited from the health improvements reflected in the countries' overall maternal mortality rates. Countries above and below the global average maternal mortality rate show varying levels of disparity between women of differing levels of education, and between rural and urban settings. Average differences in rural versus urban and education differences are lower in countries with below average maternal mortality rates, yet extreme differences still exist in some of these countries. For example, Lao PDR has a 70-point difference in skilled antenatal care for women with the highest and lowest levels of education despite having a below-average maternal mortality rate. Conversely, Rwanda has both a relatively high maternal mortality rate and nearly universal antenatal care, with 99 percent of women receiving skilled care, and little disparity between rural and urban areas or levels of education.

5.4.2. Birth Conditions

Childbirth occurring in health facilities has been identified as one of the top strategies for preventing maternal death (Filippi et al., 2006), yet the use of health

facilities is hindered by sociocultural factors, perceived needs, and economic and physical accessibility (Gabrysch & Campbell, 2009). Additionally, high coverage of maternal health interventions in health facilities does not guarantee better maternal mortality outcomes, particularly when there are issues of delayed care, disconnected elements of care in the health system, infection, and underestimated severity of presenting health conditions (Souza et al., 2013). It is also unlikely that births in a health facility can reduce maternal mortality alone, with the quality of care provided also critical (Randive, Diwan, & Costa, 2013).

Table 14 summarizes the percentage of births occurring in a health facility for countries with above- and below-average 2015 maternal mortality rates. These percentages are presented for the surveyed populations as a whole, as well as for groups living in rural and urban areas, and those in the highest and lowest education brackets. As with skilled antenatal care data, countries with above and below average maternal mortality rates showed no significant difference in the percentage of births attended by skilled staff using a Wilcoxon-Mann-Whitney test ($z = -1.485$, $p = 0.1376$). Also similar to the case of antenatal care, the DHS survey reveals in-country disparities in birth conditions. Rural versus urban location and education-related disparities again show strong differences in the use of health facilities for births.

Table 14: Percentage of Births Occurring in a Health Facility in Select Countries Above and Below the 2015 Average Global Maternal Mortality Rate (DHS Final Report data since 2010)

Country	N (# births)	MMR 2015	Report Year	%births in a health facility (all)	% births in a health facility (rural)	%births in a health facility (urban)	%births in a health facility (no edu.)	%births in a health facility (highest edu. bracket)
Below 2015 global average maternal mortality rate								
Tajikistan	5233	32	2012	76.5	73.6	87.4	69.1	93.9
Egypt	15668	33	2014	86.7	83.5	93.7	71.1	92.1
Jordan	9833	58	2012	98.8	99.3	98.6	95.1	99.7
Colombia	13254	64	2010	95.4	87.5	98.4	75	99.7
Peru	77373	68	2014	89.5	72.6	96.2	61.8	98.1
Dominican Republic	10543	92	2013	98.5	97.4	98.9	89.4	99.0
Philippines	6,982	114	2013	61.1	51.3	72.4	10.9	84.3
Indonesia	16948	126	2012	63.2	46.7	80	21.1	86.4
Honduras	10174	129	2011-12	82.7	72.9	94.2	54.9	99.4
Cambodia	8,200	161	2010	53.8	47.8	85.8	33.9	74.9
Bangladesh	4904	176	2014	37.4	30.6	56.8	15.7	68.6
Pakistan	11977	178	2012-13	48.2	40.1	67.9	34.0	89.7
Lao	4,306	197	2011-12	37.5	27.0	74.2	15.0	90.4
	Mean	109.85	2012.4	71.48	63.87	84.96	49.77	90.48
	Std. Dev.	56.79	1.51	22.55	24.69	13.66	29.53	9.88
Above 2015 global average maternal mortality rate								
Zambia	13383	224	2013-14	67.4	56.3	88.9	50.7	96.5
Nepal	5391	258	2011	35.3	31.6	71.3	19.3	74.6
Namibia	4,804	265	2013	87.4	80.4	94.7	58.0	98.5
Rwanda	8,004	290	2014-15	90.7	89.4	96.8	82.1	97.0
Gabon	5,122	291	2012	90.2	70.3	93.9	84.5	96.2
Senegal	6391	315	2012-13	71.3	60.3	92.0	64.8	93.3
Ghana	5695	319	2014	73.1	59.0	90.2	51.7	95.0
Comoros	3235	335	2012	76.1	71.9	87.8	65.8	89.0
Equatorial Guinea	2686	342	2011	67.3	53.2	83.5	46.3	91.5
Uganda	8076	343	2011	57.4	52.0	89.5	36.1	81.4
Ethiopia	11654	353	2011	9.9	4.1	49.8	4.7	75.5
Haiti	6,893	359	2012	35.9	23.6	57.2	12.8	59.2
Togo	6706	368	2013-14	72.5	60.8	93.5	55.0	93.6

Burkina Faso	15375	371	2010	66.3	60.8	93.8	62.0	96.7
Yemen	15,880	385	2013	29.8	22.6	49.1	21.2	64.5
Tanzania	8176	398	2010	50.2	41.9	82.4	33.8	84.6
Benin	13,191	405	2011-12	86.9	83.1	92.5	82.8	100
Congo, Rep.	8,170	442	2011-12	91.5	82.4	97.4	73.1	99.4
Zimbabwe	5,596	443	2010-11	65.1	56.7	85.1	35.6	95.0
Lesotho	3,112	487	2014	76.5	71.4	88.9	51.8	95.7
Mozambique	11704	489	2011	54.8	44.5	81.8	39.7	92.7
Kenya	19,564	510	2014	61.2	49.5	82.0	24.9	84.4
Niger	13347	553	2012	29.8	21.8	82.6	24.8	74.9
Mali	10402	587	2012-13	55	46.4	91.4	49.9	90.7
Cameroon	11,748	596	2011	61.2	44.1	84.6	20.7	96.6
Malawi	19,697	634	2010	73.2	71.0	85.9	63.1	97.8
Cote d'Ivoire	7,492	645	2011-12	57.4	42.7	82.0	50.1	81.9
Guinea	7067	679	2012	40.3	29.3	71.2	33.2	77.0
Congo, Dem. Rep.	18,390	693	2013-14	79.9	74.0	93.1	67.2	99.7
Gambia	7,906	706	2013	62.6	44.0	83.1	54.2	81.5
Burundi	7981	712	2010	59.5	57	86.3	51.3	90.3
Liberia	6502	725	2013	55.8	45.5	66.2	45.3	71.7
Nigeria	31,828	814	2013	35.8	21.9	61.7	11.2	91.3
Chad	18635	856	2014-15	21.7	13.9	53.4	14.4	91.3
Sierra Leone	12198	1360	2013	54.4	49.7	68.1	49.4	71.7
	Mean	501.49	2011.92	60.10	51.06	81.48	45.47	87.73
	Std. Dev.	228.00	1.32	20.46	20.99	13.71	21.35	10.79

Note: Highest level of education differs between surveys, and may refer to post- or more than secondary/grade 12/tertiary; secondary school and higher; higher than post secondary, but non tertiary; or college

Women in urban areas and those with high levels of education have greater use of health facilities for delivery. Average disparities, in this case, are over a twenty-point difference between rural and urban access in countries with below-average maternal mortality rates, and over a thirty-point difference in countries with an above-average rate. In both sets of countries, women of the lowest versus highest education levels have over a forty-point difference in use of health facilities for birth. These disparities in health

facility use are consistent with previous findings of education, distance to health facility, and urban residence as predictors of delivery with a skilled health attendant (Mpembeni et al. 2007; Gabrysch and Campbell 2009).

5.4.3. Post-Natal

Adequate post-natal care is essential for increasing maternal survival, as post-partum maternal mortality is highest during the first two days after delivery (Campbell and Graham 2006; Ronsmans and Graham 2006; Moran et al. 2013). Major causes of maternal mortality such as hemorrhaging are most effectively addressed early and with multiple interventions (Campbell & Graham, 2006; Haeri & Dildy III, 2012).

Table 15 summarizes the percentage of women receiving post-natal care within two days of delivery in MDG target countries with above and below the average global maternal mortality rate. A Wilcoxon-Mann-Whitney test showed that rates of post-natal care within two days of delivery are significantly different between the two groups of countries with above and below average maternal mortality rates ($z = -2.771$, $p = 0.0056$; non-normally distributed data). As with services before and during birth, post-natal care rates were generally higher in countries with lower maternal mortality rates. Variation between rural and urban areas, and between education levels was still present as well.

Table 15: Percentage of Post-Natal Care within Two Days of Childbirth in Select Countries Above and Below the 2015 Average Global Maternal Mortality Rate (DHS Final Report data since 2010)

Country	N	MMR 2015	Report Year	% Post-natal care within 2 days (all)	% Post-natal care within 2 days (rural)	% Post-natal care within 2 days (urban)	% Post-natal care within 2 days (no edu.)	% Post-natal care within 2 days (highest edu. bracket)
Below 2015 global average maternal mortality rate								
Tajikistan	2045	32	2012	80.3	78.1	88.4	69.5	91.4
Egypt	6297	33	2014	81.5	78.2	89.1	66.1	86.3
Jordan	3488	58	2012	82.0	87.7	80.6	66.9	90.3
Colombia	599	64	2010	3.3	2.7	4.9	2.4	*
Peru	7703	68	2014	93.0	84.2	96.6	82.4	98.4
Dominican Republic	1395	92	2013	84.2	77.9	86.4	77.5	78.5
Philippines	2,698	114	2013	72.0	65.5	79	11.64	85.5
Indonesia	6830	126	2012	80.1	74.3	86	38.8	89.5
Honduras	4158	129	2011-12	84.7	77.2	93.8	61.4	98.2
Cambodia	6,472	161	2010	70.4	66.5	89.4	51.6	85.3
Bangladesh	4627	176	2014	36.3	29.6	55.9	16.0	66.2
Pakistan	4246	178	2012-13	60.3	54.6	73.9	51.6	88.3
Lao	4,306	197	2011-12	40.6	31.9	70.9	16.3	92.9
	Mean	109.85	2012.4	66.82	62.18	76.53	47.09	87.57
	Std. Dev.	56.79	1.51	25.57	25.61	24.10	27.25	8.71
Above 2015 global average maternal mortality rate								
Zambia	5074	224	2013-14	63.4	54.3	81.4	48.1	88.6
Nepal	2030	258	2011	44.5	41.7	72.4	31.1	70.1
Namibia	1,947	265	2013	68.8	68.7	69	47.5	84.4
Rwanda	3,236	290	2014-15	43.0	42	47.8	33.1	51.6
Gabon	2,102	291	2012	58.8	44.4	61.5	51.3	60.5
Senegal	2509	315	2012-13	66.6	57.9	83.7	62.4	77.8
Ghana	2264	319	2014	81.1	73.9	90.2	68.4	93.6
Comoros	1298	335	2012	48.8	56.4	45.7	42.3	55.0
Equatorial Guinea	1105	342	2011	44.2	35.6	53.8	21.3	63.9
Uganda	3091	343	2011	33	29.1	55.9	20.5	51
Ethiopia	4284	353	2011	6.7	2.7	32.1	3.0	54.6
Haiti	2,782	359	2012	32	23.8	46.7	12.9	49.9
Togo	2682	368	2013-14	70.8	63.9	83.3	59.5	82.6
Burkina Faso	5988	371	2010	71.9	69.6	82.9	70.4	79.5
Yemen	6,110	385	2013	11.2	6.8	23.6	6.8	33.1

Tanzania	5519	398	2010	30.8	26.6	45.2	20.0	52.6
Benin	5,130	405	2011-12	51	47.7	55.8	46.9	65.9
Congo, Rep.	3,426	442	2011-12	63.8	61.2	65.5	54.2	66.0
Zimbabwe	2,448	443	2010-11	27.1	21.5	40.6	12.0	57.3
Lesotho	1,369	487	2014	62.0	59.2	69.7	*	82.5
Mozambique	-	489	2011	-	-	-	-	-
Kenya	3,544	510	2014	52.9	44.7	67.5	21.3	70.1
Niger	5143	553	2012	36.9	32.1	67.2	33.2	66.8
Mali	3965	587	2012-13	39.9	33	66.6	35	68.9
Cameroon	4,705	596	2011	37	27.8	49.4	17.1	59.5
Malawi	13,664	634	2010	43	41.4	51.6	38.4	61.9
Cote d'Ivoire	3,039	645	2011-12	70.4	62.8	82.4	66.8	82.4
Guinea	2818	679	2012	36.7	29.8	55.9	31.8	58.6
Congo, Dem. Rep.	7,168	693	2013-14	43.8	37.7	57.4	37.4	80.3
Gambia	3,392	706	2013	75.6	67.9	84.5	70.7	85.5
Burundi	3111	712	2010	29.8	28.8	41.2	25	50.1
Liberia	2650	725	2013	70.8	64.5	76.9	64.4	79.5
Nigeria	12,473	814	2013	39.6	29	59.1	18.7	81.8
Chad	6742	856	2014-15	16	30.7	12.4	11.5	50.2
Sierra Leone	4820	1360	2013	72.7	70.9	78	69.4	79.5
	Mean	501.49	2011.92	48.37	43.77	60.50	37.96	67.52
	Std. Dev.	228.00	1.32	19.40	18.77	18.54	20.81	14.40

Note 1: * denotes that a figure is based on fewer than 25 unweighted cases, and therefore is not listed
Note 2: Postnatal figures for Mozambique (2011 survey) are not available
Note 3: Highest level of education differs between surveys, and may refer to post- or more than secondary/grade 12/tertiary; secondary school and higher; higher than post secondary, but non tertiary; or college

It is unclear from this data why distributions of post-natal care significantly differ between groups of countries with above and below average maternal mortality rates while prenatal care and birth conditions do not. However, levels of postnatal care coverage do not guarantee high-quality care (Nesbitt et al., 2013). Therefore, levels of coverage may not indicate effective care. Alternatively, postnatal care may truly have been better addressed than prenatal care or birth facility use in countries with lower mortality rates,

or this intervention may be more effective in reducing maternal mortality. Further research is required to test any these conjectures.

5.4.4. Environmental Factors

Poor sanitation and drinking water have been associated with increased maternal mortality for a variety of reasons including disease and distress caused by water-borne chemical contact, infection, physical burden and danger in fetching water, and social sanitation norms (Benova, Cumming, & Campbell, 2014; Campbell, Benova, Gon, Afsana, & Cumming, 2015). Table 16 summarizes the rates of access to improved drinking water and sanitation sources in countries with above and below average 2015 global maternal mortality rates. Wilcoxon-Mann-Whitney tests reveal that rates of access to improved drinking water and improved sanitation facilities are significantly different between the two groups of countries with above and below average maternal mortality rates ($z = -3.376$, $p = 0.0007$ for improved drinking water; $z = -4.768$, $p = 0.0000$ for improved sanitation facilities). Both environmental factors have higher average rates in countries with below average maternal mortality rates. Additionally, the differences in rural and urban improved water and sanitation access are striking, with significant discrepancies in countries both above and below the global average maternal mortality rate. While we cannot link these environmental factors as direct causes of high maternal mortality, this finding is consistent with previously studies linking access to improved drinking water and sanitation with maternal health impacts (Benova et al., 2014; Campbell et al., 2015).

Table 16: Improved Drinking Water and Sanitation Rates in Select Countries Above and Below the 2015 Average Global Maternal Mortality Rate (DHS Final Report data since 2010)

Country	MMR 2015	Report Year	% urban improved drinking water	% rural improved drinking water	% total improved drinking water	% urban improved sanitation	% rural improved sanitation	% total improved sanitation
Below 2015 global average maternal mortality rate								
Tajikistan	32	2012	94.1	70.6	76.2	92.9	94.6	94.2
Egypt	33	2014	98.7	97.1	97.7	98.9	84.9	90.1
Jordan	58	2012	99.4	95.9	98.8	99.9	100	99.9
Colombia	64	2010	92	63	85	97	69	90
Peru	68	2014	86.5	69	81.7	84.8	17.7	66.1
Dominican Republic	92	2013	91.4	90.8	91.3	86.2	76	83.5
Philippines	114	2013	98.6	92.2	95.2	73.7	66.8	70.1
Indonesia	126	2012	88.7	60.5	74.5	89.4	65.9	77.6
Honduras	129	2011-12	98.3	81.6	89.8	75.8	58.8	67.1
Cambodia	161	2010	87.0[1]	53.1[1]	58.3	77.8[1]	24.7[1]	35.4
Bangladesh	176	2014	99.1	97.1	97.6	52.2	46.2	47.8
Pakistan	178	2012-13	96.8	91.2	93	86.8*	46.2*	59.5*
Lao	197	2011-12	87.6[1]	63.9[1]	69.9[1]	91.3[1]	48.2[1]	56.9[1]
Mean	109.85	2012.4	93.71	78.92	85.31	85.13	61.46	72.17
Std. Dev.	115.83	2012.44	93.68	79.56	86.01	84.53	58.91	70.47
Above 2015 global average maternal mortality rate								
Zambia	224	2013-14	89.2	46.9	63.1	39.2	19.7	27.3
Nepal	258	2011	93.5	87.8	88.6	58.1	36.7	39.5
Namibia	265	2013	97.8	71.9	84	53.2	16.7	33.8
Rwanda	290	2014-15	90.4	68.7	72.3	86.4	69.2	72.1
Gabon	291	2012	96.4	49.8	89	42.5	12.9	37.8
Senegal	315	2012-13	89.6	63.6	74.3	89.3	41.6	61.2
Ghana	319	2014	57	71.4	64.2	20.5	9.6	15
Comoros	335	2012	94.7	83.7	87.1	40.2	23.7	28.9
Equatorial Guinea	342	2011	79.5	33.4	55.3	50.5	29.9	39.7
Uganda	343	2011	89.6	66.6	70	26.3	17.4	18.7
Ethiopia	353	2011	92.8	41.6	50.8	18.2	6.8	8.8
Haiti	359	2012	87.2	49.2	64.5	38.7	20.3	27.7
Togo	368	2013-14	86	47	61.7	27.9	4.9	13.5
Burkina Faso	371	2010	94.6	71.3	76.5	81.6	14.6	29.4

Yemen	385	2013	76	50.1	58	87	34.3	50.5
Tanzania	398	2010	81.2	46	54.5	15.3*	1.6*	12.8*
Benin	405	2011-12	84	71.7	76.8	57.2	12.2	30.9
Congo, Rep.	442	2011-12	95.8	41.8	76.4	18	5.5	13.5
Zimbabwe	443	2010-11	95.1	68.7	76.7	49.8	31.8	37.3
Lesotho	487	2014	96.3	76.9	82.2	49	51.6	50.9
Mozambique	489	2011	84.6	37.8	52.5	57	14.4	27.8
Kenya	510	2014	85.7	57	66.9	30.5	21.6	24.7
Niger	553	2012	96.8	60.5	66.5	40.3	5.1	10.8
Mali	587	2012-13	93.4	59.1	66.4	45.2	17.9	23.8
Cameroon	596	2011	89.7	49.6	68.6	55.4	26.1	39.9
Malawi	634	2010	91.9	76.9	79.3	21.9	6.5	8.8
Cote d'Ivoire	645	2011-12	92.4	67.2	78.4	38.8	8.2	21.9
Guinea	679	2012	95.1	66.5	75.8	39.4	12.3	21.1
Congo, Dem. Rep.	693	2013-14	84.6	32.6	50.4	24.3	18.5	20.5
Gambia	706	2013	94.3	84.8	89.6	50.4	29	39.8
Burundi	712	2010	86.2	74.3	75.5	74.1	38.2	41.7
Liberia	725	2013	85.8	56.6	73	26.1	5	16.9
Nigeria	814	2013	77.6	47.7	59.6	42.7	28.2	34
Chad	856	2014-15	84.8	47.7	56.1	27.8	2.5	8.2
Sierra Leone	1360	2013	88.3	46.5	59.5	21.9	5.4	10.6
Mean	501.49	2011.92	88.51	59.23	69.83	44.13	20.00	28.57
Std. Dev.	228.00	1.32	7.91	14.98	11.43	20.63	15.09	15.34

Note 1: * denotes that shared or public improved facilities are not included in the figure, thus, these may be underrepresented.
Note 2: Figures for Tanzania are for mainland only, and do not include Zanzibar
Note 3: Water access figures for Cambodia are for the dry season
Note 4: [1] denotes household, rather than population, figures

The differences in environmental factors are particularly important in the face of climate change, and point to the need for holistic approaches to maternal health, including addressing the environmental resilience of health systems. Increasingly, recognition of climate change related impacts have become customary in discussions of gender equity as governmental and intergovernmental agendas focus on the social impacts of environmental shifts, particularly for marginalized populations. While climate

change affects all populations, the gendered dynamics are myriad and complex (UN Statistics Division 2015). Natural disasters have been linked to increased vulnerability for women due to gendered disparities in nutritional status, domestic burdens and hardship, and the effects of social norms on self-protection (Cannon, 2002). In Bangladesh, for instance, women's vulnerability in flooding situations is raised by stigmas around women being alone in public, a lower likelihood of swimming skills, and mobility issues due to responsibility for children (Cannon, 2002). Minimizing vulnerability and increasing resilience have become primary concerns for women in discussions of uncertain climate futures, yet the realities of adversity in the face of climate conflict are already unfolding in areas of unrest.

5.5. Shifting to a Socio-Ecological Maternal Health Agenda

The transition from the MDG to SDG strategies has been marked thus far by a push toward a more socio-ecological lens. This is illustrated most explicitly in the shift from a single MDG focused on environmental sustainability (Goal 7), to a cross-cutting incorporation of sustainability across all of the SDGs. This updated position offers an opportunity to move beyond previous one-dimensional views of maternal health, addressing social and ecological interactions affecting women's health that are increasingly recognized in developing health systems that are resilient to climate change.

Viewing public health issues as socio-ecological follows the argument among ecological economists that critical issues in society must be viewed as embedded within the environment (Daly & Farley, 2011; Griggs et al., 2013). In fact, the origins of modern epidemiology emerged through the identification of a contaminated water pump as a

transmission source for cholera in a mid-nineteenth century outbreak (Cameron & Jones, 1983). Concerns today for impacts of climate change and its effects on food, water, air, and shifting disease burdens may be larger in scale than cholera outbreaks, but include a similar challenge. As the complexity of relationships between social and environmental problems are more widely acknowledged, researchers are urging policy-makers to move beyond the compartmentalization of so-called "wicked" problems (D'agnes, D'agnes, Schwartz, Amarillo, & Castro, 2010; Lovell, Wheeler, Higgins, Irvine, & Depledge, 2014).

Maternal health is no exception, and new initiatives have been identified to address social and environmental challenges simultaneously (Harris, Mohan, Flanagan, & Hill, 2012). Outcomes have linked geographical barriers to healthcare access and nutrition (Black et al., 2008), yet many other indirect environmental factors exist as well. Women often face an uneven health burden compared with men due to higher exposure to household air pollution from solid fuel burning, increased mortality from diarrheal illness associated with inadequate clean water access, and increased risk of violence and loss of livelihood related to natural disasters and climate-related conflict (Costello et al. 2009; Ezzati and Kammen 2002; UN Statistics Division 2015). Furthermore, women's knowledge often remains overlooked in decision-making processes, even when they perform a majority of climate- and natural resource-sensitive work. In a study of Tanzanian pastoralist societies, for example, women were found to have little role in decision-making processes related to livestock, despite daily animal care and concomitant exposure to zoonotic disease (Nguvava et al., 2009).

Perhaps most concerning is the potential for gendered impacts from increased conflict due to climate change. Conflict has been seen as a major barrier to achieving MDG goals (Gates, Hegre, Nygård, & Strand, 2012; Stewart, 2003) and climate-related conflict, often related to natural resource scarcity, has been tied to increased violence against women (Demetriades & Esplen, 2008). This is particularly important as a rise in conflict related to climate change is anticipated during the SDG period and beyond (Hsiang & Burke, 2013; Hsiang, Burke, & Miguel, 2013).

Figure 10 highlights climate vulnerability in all countries worldwide for which data is available, measured as a composite of exposure that signifies the degree of harm a community experiences resulting from climate change (DARA, 2012). As a group, countries with relatively high maternal mortality rates are more vulnerable to climate change than those with relatively low rates. Figure 11 projects increasing climate vulnerability by 2030, with particular exposure noted in countries with high maternal mortality rates. Social and environmental issues are seen to compound each other, leaving some areas and populations exponentially worse off than others in the face of climate change (O'Brien & Leichenko, 2000). Given the threat of rapidly changing environmental conditions, it would be unwise to assume that maternal health will continue to improve steadily with the knowledge of rising potential for climate-related conflict and resource scarcity.

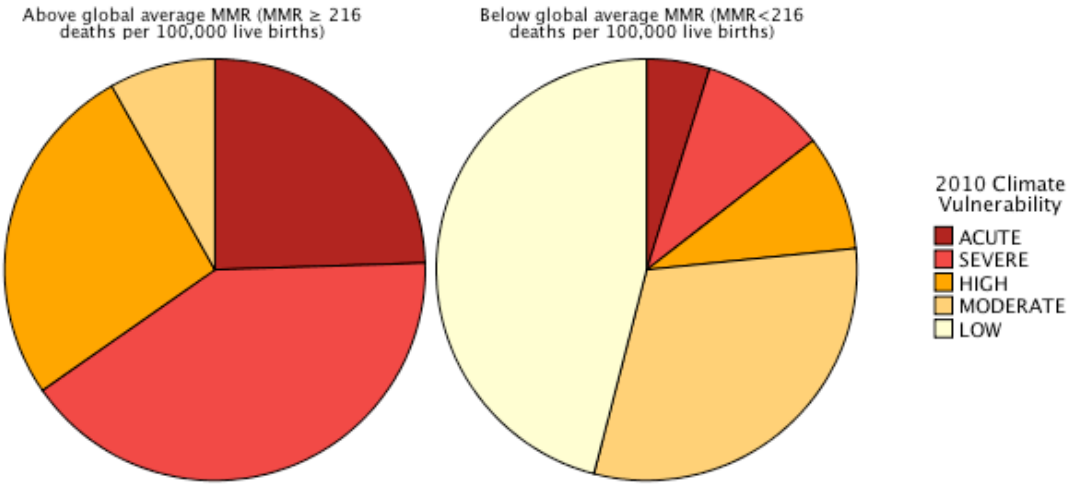

Figure 10: Climate vulnerability level in 2010 in countries with above and below average 2015 maternal mortality rates (DARA, 2012; WHO, 2015d)

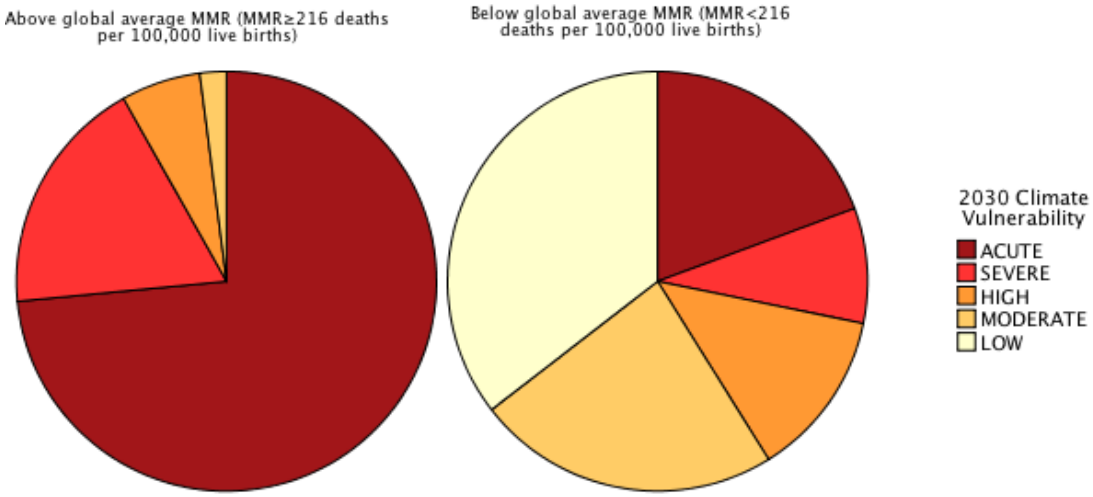

Figure 11: Climate vulnerability level for 2030 in countries with above and below average 2015 maternal mortality rates (DARA, 2012; WHO, 2015d)

The resilience of national health systems under increased climate vulnerability affects the capacity to serve all women throughout pregnancy and childbirth (Keim 2008; Oven et al. 2012; Ford et al. 2010). By targeting local systems and their climate vulnerability, particularly those serving marginalized populations, development agendas

may be able to provide strong health improvements that serve both present and future populations. By addressing maternal healthcare as a socio-ecological challenge, the potentially catastrophic impacts to women's health from climate change may be mitigated. Continuing a business-as-usual strategy toward maternal health in international development agendas would not only be shortsighted, but also inequitable and potentially catastrophic to women's global health.

5.6. Conclusion

Public health experts have long highlighted the importance of environmental factors on health (WHO, 2015a). Maternal health outcomes offer an example of a need for improvement in strategies that address human and ecological needs, yet political pressures related to development, growth, and human rights have stifled the ability of international development agendas to achieve goals related to maternal mortality and wellbeing (Yamin & Boulanger, 2014). However, conceptualizing maternal health as a socio-ecological issue could help to more holistically and sustainably address the needs of women globally, as well as the environments on which they depend.

In comparing countries with above and below-average maternal mortality rates, we find that that on the surface, these two groups of countries have little difference in the antenatal and birthing services that we examined. However, access to post-natal care was statistically significant between country groups, suggesting an influence on reducing maternal mortality rates. At the sub-national level, significant differences were found for prenatal, birth, and post-natal conditions between urban and rural populations, as well as between high and low education attainment. The strongest results were with

environmental factors, showing significant differences between above- and below-average countries at national levels, between urban and rural populations, and due to education differences.

As the SDG strategy takes over from the previous MDG agenda, the UN aims to lower the maternal mortality rate below seventy deaths per 100,000 live births by 2030—still far below the levels of developing (and some developed) countries. Ongoing challenges around inadequate data collection, gender inequality, and unjust power dynamics not withstanding, the SDGs seek to better integrate sustainability into previously strictly social goals. Improving the resilience of socio-ecological systems can help avoid poverty traps as well as resource degradation (Barrett, 2008). Additionally, socio-ecological issues must be addressed at more local scales so that inter-group inequalities can be better understood and overcome local environmental barriers. It is also crucial that progress made thus far in reducing maternal mortality does not lead to complacency or an assumption of a straightforward, conflict-free path to improved conditions.

Finally, the integration of sustainability across the SDGs may better direct resources to create health systems more resilient to climate-related events including natural disasters and resulting conflict. There is no doubt that to achieve this, further research on the regional and local tailoring of aid efforts and methods of integrating social and ecological goals will be necessary to address the complex web of issues that the planet faces today. By addressing maternal health and climate change as inherently

linked, international governance bodies may better achieve their goals in a manner that is indeed just and sustainable.

5.7. References

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CHAPTER 6: CONCLUSION

The issue of gender equality is presented here as a social, economic, and environmental issue that has previously been relegated to disparate social and/or economic spheres in policymaking, with little attention to ecological aspects or the need for integration of these realms. The traditional framing of gender equality as a social or economic issue overlooks the crucial role played by ecology in perpetuating differences between men's and women's opportunities, rights, and responsibilities. As mainstream economics overlooks areas critical to human and environmental wellbeing, strictly social or ecological treatments of gender equality and other concerns also miss critical aspects of contextualization if economics, ecology, or society are ignored. Resilience and sustainability may be better achieved in social, economic, and environmental realms by adopting a socio-ecological framework rather than allowing continued isolation of this complex issue.

Three central questions in this dissertation address the disconnect between mainstream economic and policy measures and the potential to apply a socio-ecological lens to the issue of gender inequality:

1. What issues have caused dominant economic paradigms to resist justice as a significant concern?

2. How do macroeconomic systems contribute to gender inequalities?

3. Are international development agendas that address gendered health outcomes at the national level effective, and if not, what could better improve women's health outcomes?

The three papers are intended to serve as proxies for broader gender equality issues by evaluating underlying theories of justice, providing an example of women being overlooked in traditional and isolated economic frameworks, and examining the treatment of a gendered issue in the context of international development. The first paper, outlining the relationship between justice and mainstream economics, provides a theoretical backdrop for the discussion of gender as a multifaceted form of justice. The second paper, on the macroeconomic impacts of unpaid labor, highlights the shortcomings of a mainstream economic approach that undervalues women's contributions to society. The third paper examines maternal health as proxy for other forms of gender equality in international policy agendas.

Shaping policy to better reflect inter- and intra-group inequalities will require attention to factors that may be obscured at the national or international level (Fisher & Naidoo, 2016). Including factors such as socioeconomic status, class, religion, rural or urban residence, (dis)ability, ethnicity, and race in data collection, and ensuring that diverse groups are accounted for surveys, can enable more nuanced understanding of barriers to equality. In the case of maternal health, the third study in this dissertation shows that national-level improvements in healthcare overlook sub-national inequalities between women with varying levels of education and those who live in rural versus urban areas. A major problem with this abstraction is that country-level target goals can create a uniform picture for the country's population, even if there is vast inequality within national borders. Setting goals that address inequalities within countries can thus serve a

broader population and encourage equality more earnestly through policy measures at various levels of governance.

Policy targets should also reflect the holistic nature of inequality. Gendered issues in policymaking, for example, can benefit from social, environmental, and economic lenses developed together. When these different types of approaches are employed piecemeal and with little integration, policy outcomes lack the depth needed to ensure resilient forms of equality are achieved. This is seen in the preceding papers both as traditional economic modeling, which leaves out diverse perspectives such as feminist theory, and in a lack of integration of environmental metrics in maternal health strategies.

Academic guidance toward policymaking must also adopt more integrated approaches to studying equity. Chapter 3 of this dissertation highlights the isolationism and resistance to collective justice frameworks present in mainstream economics today, aligning with previous findings by researchers including Fourcade et al. (2015), Nelson (1992), and Pujol (1992). Chapter 4 provides one approach to diversifying economic modeling through the adaptation of a mainstream approach built on a Solow framework, with the addition of feminist principles of labor to consider the macroeconomic impact of both paid and unpaid work.

Areas that would benefit from future research include sub-national analyses of gender inequalities, such as thorough data collection on the challenges faced by different groups of women. These studies should not only cover traditional socioeconomic concerns, but also incorporate ecological factors that affect wellbeing. For example, access to modern energy sources (e.g., electricity) disproportionately affect women due to

an uneven burden of solid fuel collection and increased exposure to indoor air pollution from solid fuel sources, yet knowledge of gender differences in time use, exposure, and vulnerability are greatly limited by inadequate data (United Nations Statistics Division, 2015b). Most importantly, the deep connection between these realms must be both acknowledged and included in analysis. Gender equity is addressed here as a space for expanding integrated socio-ecological thinking, yet there are many other examples of injustice that can be better addressed through multidisciplinary ideas as well. Environmental justice, for example, has drawn on social and ecological knowledge to foster an expansion both of standard interpretations of outcomes related to racism and other forms of injustice, and of the notion of environment itself (see Schlosberg, 2013, for further discussion). Additionally, the outcomes of addressing gender inequality are not just directly felt in society, but can lead to better environmental outcomes. For example, addressing gender equality in care work can lead to positive ecological outcomes through factors such as lower infant mortality and fertility that result in a less resource-intensive population.

The need for novel policy solutions to gender inequality is also intensified by the ongoing threat of ecological shifts that put women at a disproportionate disadvantage compared to men (Black et al., 2008; Costello et al., 2009; Ezzati & Kammen, 2002; Nguvava et al., 2009; United Nations Statistics Division, 2015b). Addressing gender inequalities in issues such as care work, as explored in Chapter 4, can foster improved ecological outcomes, resulting in outcomes such as the redistribution of resources to

benefit vulnerable populations such as children (Folaranmi, 2013; Luke & Munshi, 2011; D. Thomas, 1990).

The major conclusions of this dissertation are two-fold: first, that gender inequalities should be addressed according to ecological contexts; and second, that mainstream policy approaches overlook opportunities to integrate social, ecological, and economic goals. This problem can be addressed in part by changing the measurement and framing of gender inequalities, so that mainstream approaches may better value areas that are critical to human wellbeing.

This need for integrated policy and research is only made more critical by the onset of climate change, and as such, the time has come to view gender equity as a socio-ecological challenge. With an expected rise in climate-related migration and the potential for political conflict related to natural resource scarcity (Hsiang & Burke, 2013; Hsiang, Burke, & Miguel, 2013), women face greater risks of greater gender violence (Demetriades & Esplen, 2008). Disparities in factors such as nutritional status, domestic burdens, and mobility cause additional stress on women in the face of natural disasters (Cannon, 2002). In the face of ecological uncertainty, holistic approaches must target the underlying causes of gender inequality, including both social and ecological dimensions. Most importantly, however, policies and research must work to understand the deeply intertwined relationship between these realms, and work to achieve gender equity in this context.

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