

Reproductive Health Capability: Towards a tool to measure inequity in reproductive health. A
case study of Colombia.

By

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Declaration

I declare that this dissertation is the results of my own work and has not been submitted in support of an application for another degree at this or any other university. Some of the ideas in this dissertation were the product of discussions with my supervisor Luke Parry.

Abstract

Despite global improvements in typical reproductive health indicators, inequities in reproductive health are widening within and between sub-populations. To address reproductive health inequity, a theory of justice is required. Reproductive Justice, the most recent development of the reproductive health discourse, provides encouraging insight into the real, intersectional, and socially unjust reproductive oppressions experienced by vulnerable and minority populations. However, Reproductive Justice has limitations - notably it cannot operate as a complete moral theory. It has been argued for an application of Sen's Capability Approach to reproductive health; the theory provides a more realistic assessment of women's reproductive health because it assesses their actual ability to realise valued outcomes. This research supports the application of the capability approach to reproductive health and Reproductive Justice.

To measure reproductive health inequity, a conceptual framework entitled: Reproductive Health Capability is developed. Unlike previous work on capability and reproductive health, this project identifies the relevant capabilities a woman requires to be in good reproductive health, as guided by Reproductive Justice and capability literature. These capabilities are universal, instrumental, and intrinsic to reproductive health; a deficit in these capabilities is grounds for injustice.

Using data collected from Colombia's 2015 DHS survey, exploratory data analysis is undertaken to translate these capabilities into an empirical multidimensional measure. From this, the potential for the DHS to be re-purposed to measure health justice is assessed. Using this empirical measure, reproductive health capability for women in Colombia is assessed.

This project finds a valid and reliable empirical index that captures Reproductive Health Capability for women in Colombia. It finds a novel index of health agency and supports the development of agency-focused health interventions. Empirical analysis also finds women living in rural and Pacific and Amazon/Orinoco regions, who are indigenous and Afro-Colombian, and with little education have limited capability to reproductive health.

Key Words: Capability Approach, Reproductive Justice, reproductive health, inequity, Colombia, multidimensional measure.

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Chapter 1. Introduction

“Ni soy histeria, ni estoy menstruando, Grito porque nos stan asesiane.” I am not hysterical nor am I menstruating, I’m shouting because they are killing us.

This is what one placard read at Colombia’s 2019 International Day Against Violence Against Women protest along Bogota’s streets (Fortune, 2021). In 2019, some of Colombia’s feminist movements such as *Las Viejas Verdes* (The Old Greens), *Estamos Listas* (We’re ready), and *Siete Polas* (Seven Poles) united together with *Paro Nacional* (the National Strike) to oppose violence against women and reproductive oppression (Wadekar, 2019). Colombia’s history is marked by a fifty-seven-year civil conflict that has led to widespread violence and the systematic violation of women’s reproductive autonomy and health (Fortune, 2021). This so-called reproductive violence is not only a structural circumstance of the country’s civil war but an experience reinforcing existing forms of violence and discrimination against women (Fortune, 2021). To command one’s reproductive destiny is to live the life one values; for women and men this is an absolute ambition (Hart, 2012). For women, in particular, this means challenging the belief that their gender exists only to care for others (Hart, 2012). Women are still fighting for reproductive health and autonomy, and many are vulnerable to discrimination (Hart, 2012). As Hilder Maria, leader of the feminist and reproductive rights movement *Las Viejas Verdad* so adamantly puts it, the primary objective is to “*defend our bodies, [this] is our first territorio*” (territory) (Hilder Maria in Sandoval, 2020).

Significant global efforts have been made to address poor outcomes in women's reproductive health (Cardenas-Cardenas et al., 2015). Typical reproductive health indicators such as maternal and infant mortality have shown promising reductions over the past three decades (Carlos Rivillas et al., 2020); the maternal mortality ratio (MMR, number of maternal deaths per 100,000 live births) dropped by about 38% globally between 2000 and 2017 (WHO, 2019). In Colombia, for example, maternal mortality fell by 34% over a fifteen-year period, and in 2015, the country reported 64 maternal deaths per 100,000 live births (WHO, 2015). Many countries have united to advance the reduction in maternal mortality by 2030 as part of the Sustainable Development Goals (SDGs) (WHO, 2019).

During this time the reproductive health discourse has made its own developments, evolving from state-led natalist and disease models of reproductive health, to frameworks concerned for women's rights and female emancipation (Malhotra & Mehre, 1999). It was the 1994 United Nations Cairo Conference that led to a significant paradigm shift in reproductive health policy (Jayasundara, 2009). The International Conference on Population and Development (1994) enacted landmark transformations in the way reproductive health was viewed, the rhetoric used, and the overall approach of reproductive health policies in developing countries (Petchesky, 1995; Jayasundara, 2009). Notably, the intrinsic value of reproductive health and reproductive rights to women's wellbeing was acknowledged for the first time and became firmly secured in international development agendas (Ravindran, 2008; Jayasundara, 2009). Distinctly feminist, reproductive health no longer meant to be without disease but also to exercise one's reproductive autonomy. Most recently, a new movement tackling reproductive health and rights has emerged - Reproductive Justice. Reproductive justice is an advocacy movement grounded in the belief that systematic inequality has continually influenced women's decision making around parenting and childbearing (Ross, 2018). In a critique of western-centred ideas of women's reproductive rights, Reproductive Justice provides encouraging insight into the real, intersectional, and socially unjust reproductive oppressions experienced by vulnerable and minority women.

While at the population level health improvements have been promising, inequalities between and within populations are widening (Jayasundara, 2009). 94% of all maternal deaths in 2017 occurred in low and lower middle-income countries (WHO, 2019). Young adolescents (ages 10-14) bear a greater risk of pregnancy complications and death than older women (WHO, 2019), and the latest health

analysis in Colombia shows Afro-Colombian and indigenous women with the highest concentration of maternal deaths (Ministerio de Salud y Protección Social MSPS, 2014). Moreover, inequalities in wider social determinants remain; inadequate access to sexual and reproductive (SRH) services are frequently associated with unequal regional development (Gutiérrez et al., 2019), socioeconomic vulnerability (Wagstaff, 2019), and race and ethnicity (Schreffler et al., 2015; Ross & Solinger, 2017). Equally, contraceptive coercion and unintended pregnancy evidence a prevailing lack of women's reproductive autonomy (Darroch & Singh, 2013; Upadhyay et al., 2014). These are the outcomes of particular processes and political decisions that drive systematic health inequality between social groups (Braveman & Gruskin, 2003). Critically, these are health inequities - the inequalities that are unfair or unjust (Braveman & Gruskin, 2003). Effective measurement and monitoring of reproductive health inequities are vital to address them and develop appropriate policy.

Despite the need for spatiotemporal analysis of reproductive health inequities, current instruments such as disability adjusted life years (DALYs) and a wealth of social determinants of health frameworks (SDOH) fail to focus on measuring health equity, and the mechanisms through which associations between health and social determinants act (Graham et al., 2004; DeJong, 2006; Dover & Belon, 2019). DALYs have certainly been promising by moving away from a focus solely on mortality to include the collective experience of disability over a life time; they are commended for their comparability, authority and objectivity (DeJong, 2006). However, they neglect important socio-economic and social determinants of health, the very indicators of unjust processes. More so, rarely do reproductive health assessments measure concepts of reproductive rights and autonomy (Jayasundara, 2009).

Measuring inequity is explicitly normative, however, and requires a theory of justice to tell us why an outcome is particularly troubling and how resources should be distributed (Bailey, 2011). We have many options to choose from; Reproductive Justice has worked hard to illuminate the processes that contribute to unfair outcomes for particular groups but, despite its name, it cannot operate as an independent moral theory (Bailey, 2011). Equality of outcome models are limited by objective measures that fail to capture goals valued by the individual (Ruger, 2006). Equality of opportunity models are limited by the "inputs" for health and pay little attention to whether a health outcome is actually achieved (Ruger, 2006). It has previously been argued for an application of Sen's capability

approach to reproductive health as it offers a more realistic assessment of women's reproductive health because it assesses their actual ability to convert opportunities into valued outcomes (DeJong, 2006). While these, too, have been promising, none have identified the specific capabilities a woman needs in order to be in good reproductive health and exercise reproductive autonomy. No previous study has explicitly attempted to develop an empirical measure of reproductive health justice based on Sen's framework. Without such, essential quantitative evidence to support equity-driven policies remains non-existent.

Therefore, the purpose of this study is to address the wider need to better measure reproductive health inequities. In providing a theory of justice, this study supports the application of the capability approach to reproductive health but also argues for the application in response to the limitations of Reproductive Justice. In doing so I develop a conceptual framework that explicitly considers the relevant and universal capabilities a woman requires in order to be in good reproductive health. The conceptual framework is entitled Reproductive Health Capability and, specifically, includes health, healthcare, health agency, empowerment, and bodily integrity. These capabilities are universal, instrumental, and intrinsic to reproductive health; a deficit in these capabilities are the grounds for injustice.

Using data collected from Colombia's 2015 Demographic and Health Survey (DHS), exploratory data analysis is undertaken to translate these capabilities into an empirical measure of Reproductive Health Capability. In turn, I assess the potential for the DHS, a widely used, international and standardised survey, to be repurposed to effectively measure Reproductive Health Capability. Using this empirical measure, I then assess Reproductive Health Capability for women in Colombia.

Colombia is marked by significant unequal regional development, the outcome of a weak and absent government and a near sixty-year civil conflict (Weeks, 2018; Berry, 2017; Hawthorne & Kwan, 2012). Armed conflict has reinforced patriarchal models of dominance over women and systematic reproductive violence (Ramos-Jaraba et al., 2020). Armed conflict has also led to mass displacement causing large asset losses and employment opportunities for women, whilst also contributing to a prevalence of psychosocial problems and worsening health (Caldron et al., 2011). Moreover, colonial oppression has led to the social exclusion of many ethnic minority women (Melo, 2015). Despite healthcare reform in the 90s to a universal model, access, utilisation, and quality remain fragmented

and unequal in Colombia's health system (Osorio et al., 2014). Consequently, 60% of maternal deaths in 2014 occurred among the 50% poorest and most illiterate population, 24% of them among the Afro-Colombian and indigenous population (Toro Roa et al., 2019). Although this study does not analyse the impacts of COVID-19, nor those of the Venezuelan economic crisis, these issues remain significant threats to women's reproductive health. Future research can apply Reproductive Health Capability to these issues.

1.2 Research Aim and Objectives

In order to address the need for better measurement of reproductive health inequities, I conduct our study with the following objectives:

1. Identify the relevant capabilities to women's Reproductive Health Capability.
2. Convert Reproductive Health Capability into an empirical measure.
3. Assess the reliability and validity of this measure using DHS survey data, and assess whether the use of a pre-existing international and standardised survey can be repurposed to effectively measure Reproductive Health Capability.
4. To assess what Reproductive Health Capability looks like for women in Colombia.

Chapter 2. Developing a conceptual framework: Reproductive Health Capability

First conceptualised in the late 90s, the Reproductive Justice movement has provided a contemporary approach to achieve better reproductive health for women by mobilising action outside of the courts and within the community. At its centre are three central human rights: the right to parent, the right not to parent, and the right to parent with dignity and free from violence (Ross, 2017). Reproductive Justice was born out of the critique of reproductive rights, arguing that such rights were based on issues of privacy, abortion, and contraception – issues essentially representing privileged (and often white) women (Ross & Solinger 2018). Reproductive Justice, on the other hand, examines the contexts that have significantly enabled women to make meaningful and well-informed reproductive decisions. Departing from more contemporary liberal feminist arguments, Reproductive Justice stresses that the hyper-rational agentic self (Braun, 2009) simply cannot be responsible for reproductive choices where even access to basic healthcare has not been achieved, let alone the ability to live free from violence. Secondly, Reproductive Justice is firmly rooted in ideas of Social Justice. The concept identifies inequalities in health to be the consequence of poverty, environmental injustice, and inequality of distribution of vital resources. Importantly, inequalities in health are the outcomes of an unfair distribution of burdens determined by structural and and/or explicit discrimination. To do so, the concept – and this is perhaps its most progressive feature – must operate as an intersectional methodology. Reproductive injustice is experience through multiple oppressions of gender, class, race, ability, sexuality, age, and immigration status to name a few (Ross, 2018). For instance, a Black able-bodied woman's experience of pregnancy may be very different to a White disabled woman's experience. The axis of socio-economic and -demographic lines result in contrasting experiences of reproductive health: different outcomes in health status, experiences of healthcare, and inequality of social resources. Thus, the concept advances the reproductive health discourse by recognising the systematic inequalities that influence women's parenting and childbearing decisions (Ross, 2017). Hence, Reproductive Justice makes a broader and more accessible argument in protecting women's reproductive health.

2.1. What has Reproductive Justice replaced?

Reproductive Justice provides the most recent contribution to the reproductive health discourse and supersedes an anti-natalist approach, an epidemiologically based public health definition, and finally,

a contemporary public health and rights-based approach (Jayasundara, 2009). Reproductive justice marks a significant evolution from reproductive rights, to social justice.

Prior to any discussion of rights and justice, a demographic determinist, or neo-Malthusian, approach was the original perspective through which reproductive health was defined. This was based upon the argument proposed by Thomas Malthus that population growth posed a serious threat to economic development, the environment, and public health; thus, the population must be controlled (Ashford, 2001). Consequently, reproductive health took the meaning of fertility control, grounded in strong anti-natalist foundations. This view grew in popularity in the 1940s and 60s, periods of high population and economic growth in many countries (Jayasundara, 2009). At this time, population interventions were associated with socioeconomic development policies (Frey, 2011), and the larger societal benefit of population control outweighed any concept of reproductive freedom. Population deterministic approaches were heavily criticised for their complete apathy of women's reproductive rights, and flawed connections between population and environmental degradation (Jayasundara, 2009).

Therefore, an epidemiologically based public health model of reproductive health emerged in recognition that fertility control held a limited view of reproductive health issues. Traditional public health is interested in illness and how illness affects populations; reproductive health, by consequence, is concerned with the mortality and morbidity relating to a woman's entire reproductive system (Cottingham & Myntti, 2002). Typical public health interventions have involved forms of surveillance (e.g. monitoring of child mortality clarity), sanitary measures (e.g. safe drinking water and food), and infectious disease controls (e.g. vaccinations, screening, and quarantines), and the medical contributions are promising (Gostin, 2001). The positive effects of increased vaccine coverage on infant and child mortality rates are widely known (Feikin et al., 2015). The "*Decade of Vaccinations*" between 2010 to 2020 increased the coverage of vaccinations considerably from around 5% in 1974 to 84% in 2013, even accounting for inter and intra-state variations (McGovern and Canning, 2015). In view of this, traditional public health is less interested in clinical interactions between patients and healthcare professionals, and more so in composing programmes to avoid disease and injury (Gostin, 2001). In this objective approach, reproductive health, thus, becomes a feature of a broader public health model; establishing risk factors affecting reproduction is in the interest of public health (Jayasundara, 2009).

While focusing on illness and its effect on populations is understandable, as interventions to avert suffering are a clear and compelling response (Gostin, 2001; Cottingham & Myntti, 2002), the goal of traditional public health is distinctly utilitarian, aiming for a generally high level of health within a population, rather than the best possible health for a few (Gostin, 2001). In its utilitarian state, public health cannot account for justice, and attempting to reconcile utility with justice is difficult. Traditional public health approaches determine the rightness of a policy by whether social utility has been maximised (MacKay, 2018), and not in the distributional, practical, or *a priori* implications (Ruger, 2005). Moreover, concepts such as women's autonomy and equality are not of interest. In other words, utilitarian approaches can tolerate significant, even uncomfortable, inequalities (Jones, 2010). It is important to note, however, that it is not the approach being consequentialist that renders it incompatible with justice, but its principle of utility.

In criticism of anti-natalist and narrow biomedically-led approaches to reproductive health, Cairo's 1994 International Conference on Population and Development (ICPD) marked a significant paradigm shift for reproductive health (Pillai & Johnson, 2010, Ashford, 2001; Correa, 1997). The ICPD defines reproductive health as:

"A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes. Reproductive health, therefore, implies that people are able to have a satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how often to do so." (ICPD 1994:18).

The ICPD's definition made a monumental claim in broadening the focus of reproductive health to include concepts such as self-determination and equity, incorporating a positive notion of health (Cottingham & Myntti, 2002). Conceptually, the term reproductive health describes a model which considers women's well-being and health, not as a means towards fertility reduction, but as eminent in their own right (DeJong, 2006).

In this way, the ICPD makes a claim for *reproductive rights* as integral to reproductive health and appoints a decidedly feminist objective to population programmes. The Programme of Action also aims to:

"[advance] gender equality and equity and the empowerment of women, and the elimination of all kinds of violence against women, and ensuring women's ability to control their own fertility, [these] are cornerstones of population and development-related programmes." (U.N. 1994, Chapter VIIa).

Rights include: a woman's right to choose, her right to privacy, right to access services, the right to be free from discrimination, violence, and coercion, and her achieved access to social resources (Ashford, 2001). Demanding women's empowerment in this way also acknowledges their decision-making capability and ability to exercise power in highly public (e.g. in work, the courts) and the most personal of spaces (Roseman & Reichenbach, 2010). Taking a firm principle-based approach made for a significant development from previous consequentialist arguments for improvements in women's health (Jayasundara, 2009).

However, the ICPD did not come without criticism. Aside from common complaints regarding its expansive nature, lack of precision, and applicability (Mann, 2017), the ICPD's notion of reproductive health had several more pressing issues. Discussions on whether the ICPD's definition progresses or challenges a reproductive health paradigm (Petchesky, 1998), whether it provides the means for old-style population policies to be co-opted by feminist ideas (Petchesky, 2003) or the means to impose subjective views of reproductive freedom (Correa, 1997) have been made. Indeed, Western feminists tend to focus on Cairo's statements on women's reproductive rights and their relationship with gender. These scholars assert the primary concern of women's autonomy with respect to reproductive health decision-making (Petchesky, 1998). Reproductive autonomy, arguably, lies in the foundation of *"individual self-determination"* (Dixon-Mueller, 1993: 12). Scholars of the Global South however argue that rights are meaningless if the circumstances in which women realise these "freedoms" are neglected (Correa et al., 1994; Petchesky, 1998). Having rights and having the conditions under which one can exercise these rights are two separate priorities (Correa et al., 1994). In some instances, it may very well be gender relations that determine a woman's ability to exercise her reproductive freedom, as Correa et al., observes: *"A woman's decision represents a balancing of her own, her family's, and sometimes her community's needs. This decision represents critical markers of a woman's reproductive autonomy and her right to health"* (1994: 69). At other times, it may be reproductive oppression, *"hegemonic economic structures, unsupportive political regiments, or simply*

a lack of quality and accessible health services” that are the disabling conditions for women to exercise her freedom (Jayasundara, 2009: 16). Crucially, women must have real and achieved rights, rather than the mere idea of rights (Ross, 2017) and a Western conception of women’s rights should not impose a preconceived notion of what women need and value (Qadeer, 1998).

Moreover, a rather unnoticed fault of the ICPD’s definition is its failure to acknowledge ethnic and racial divisions that exist among almost all contemporary societies (Petchesky, 1995). In discussing women as a collective, homogenous entity, it does not recognise the implications of race and ethnic divisions that significantly worsen reproductive health. Ethnic minority women, and those who are especially poor - are more vulnerable to involuntary sterilisation, for example, lack of maternal health services, neglect, and reproductive health risks (Petchesky, 1995). The ICPD misses the opportunity to advance health policies that are appropriate for diverse populations. This failure has further reduced reproductive health rights (Petchesky, 1995).

Tensions between Western liberal feminism and feminism of the Global South have led to concern over whether reproductive rights are the most appropriate goal for reproductive health advocates. Equally, neglect for race and ethnic divisions within populations have all proven to be great challenges for contemporary and comprehensive understandings of reproductive health. Nevertheless, the ICPD retains its status as a pivotal moment in the reproductive health paradigm. It acknowledges that reproductive health, rather uniquely for health, has two distinguishing features: health and freedom. Both are crucial for women’s overall wellbeing and will be relevant for application to capability thinking.

2.2. Reproductive Justice: in more detail

After attending the Cairo Conference and hearing the debates on how to slow population growth and protect women’s rights, a group of American Women of Colour realised: that “[our] ability to control what happens to our bodies is constantly challenged by poverty, racism, environmental degradation, sexism, homophobia, and injustice” (Ross quoted in Silliman et al., 2016:4). Reproductive Justice, not to replace reproductive rights (legal advocacy) nor reproductive health (service provision), acknowledged the intersectional forms of oppression that threaten women’s ability to have good reproductive health. Reproductive rights movements relied on a “choice” rhetoric and issues of

privacy, abortion, and contraception rights; issues essentially representing those of middle-class women (Thomsen, 2015). Reproductive Justice, on the other hand, serves as a concept to amplify the systematic inequality which influences women's decision-making around their reproductive health (Ross, 2018). Reproductive Justice is based on three complementary sets of human rights:

1. The right to have a child under the conditions of one's choosing,
2. The right to not have a child using birth control, abortions, or abstinence; and
3. The right to parent children in safe and healthy environments free from violence by individuals or the state.

Reproductive Justice has three additional principles that make it a particularly powerful approach to both achieving better reproductive health for women and mobilising action for social justice (Rebouche, 2016). Firstly, Reproductive Justice examines the contexts that have significantly enabled individuals to make meaningful and well-informed reproductive decisions (Unnithan & Pigg, 2014). The movement incorporates a powerful critique of "choice" (Rebouche, 2016) – evaluating both a woman's ability to *exercise* her choice and also the *quality* of the choices presented to her. Taking the issue of women's ability to exercise reproductive autonomy first, Reproductive Justice identified the very agency-limiting context for women to access abortion. *Roe vs Wade* in the U.S., for example, was a decision to add abortion to the reproductive choices a woman could make. The court, however, relied on privacy as its justification in essentially establishing a negative right of non-interference from the state. Little regard for the historical and contemporary structures of oppression that limit some women's (poor and often women of colour) access to income, resources, and reproductive health services, meant that the right to privacy remained conditional (Ross & Solinger, 2017). Privacy was for the privileged and those women who relied on being legible to the state were once again forgotten; ultimately, emphasising choice and privacy disappoints wider feminist goals (Ross & Solinger, 2017). In this way, Reproductive Justice was and remains concerned about the types of constraints particular women face in exercising choice, and often the issue of *access* remains a capability not guaranteed for vulnerable women.

Moreover, Reproductive Justice raises questions over *quality* of choice. This is a departure from more contemporary liberal feminist arguments on women's autonomy. The neoliberal turn in Feminism affirmed an agentic rational self, hyper-responsible for individualised decisions, and isolated from any

contextual constraints (Braun, 2009). This so-called “choice feminism” emerged from efforts to appeal to a wider group of women (Hirshman, 2005), however, conflating choice within feminism without the critical introspection required to judge whether a woman’s “choice” is in her best interest is questionable. Sterilisation is a useful example; recent literature on the determinants of sterilisation in Latin America and around the world note the extraordinary measures women take to have the operation (Dalsgaard, 2004). More recent qualitative research acknowledges the procedure to be part of a wider process of empowerment giving women the freedom from a life dictated by their reproductive capabilities (Jadhav & Vala-Haynes, 2018). On the one hand, viewing sterilisation as a choice may reflect shifts in liberal feminist literature that is sympathetic to cultural relativism, and a researcher’s own bias. On the other, the prevalence of sterilisation may indicate a response to a service the state long failed to provide (Correa, 1994). It is conceivable that the reasons for “conscious choices” made by women seeking sterilisation, are *“not exactly a choice, but an option among few alternatives”* (Correa, 1994: 26). Fundamentally, the concept of choice is abstract, hollow, and unable to *“speak to the concrete realities experienced by women of colour”* (Luthra, 1993: 44). Reproductive Justice’s ability to illuminate the meanings appointed to reproductive relations, and the external structures that determine women’s reproductive autonomy is a progressive move for the reproductive health discourse.

Secondly, Reproductive Justice goes beyond a language of reproductive rights to adopting ideas of social justice, and through which, attempts to make a moral claim to reproductive oppression (Chiweshe et al., 2017; Bailey, 2011). Reproductive Justice literature refers to human rights as central to the movement. It emphasises the importance of formal and substantive equality and progressively realised rights (Rebouche, 2016). Consequently, the movement makes a broader and more accessible argument in protecting women’s reproductive justice. In turn, addressing community moralities and power inequalities (Luna & Luker, 2013). ‘Community moralities’ refers here to the term used in ethics whereby the actions which affect those in one’s moral community should always be proceeded with ethical reflection (Lindeman, n.d.). In other words, Reproductive Justice asks the question: *“is this right?”* when indicating reproductive oppression. Reproductive Justice illustrates how some women’s experiences have been overshadowed by the traditional narrative around reproductive rights, and argues for a far deeper moral concern centred around human rights and justice.

Finally, and perhaps Reproductive Justice's most promising contribution, is its operation as an intersectional methodology. Women's lack of power and self-determination is experienced through the multiple oppressions of gender, class, race, ability, sexuality, age and immigration status (Ross, 2018). Intersectionality, the term coined by legal scholar Kimberle Crenshaw, describes *"the way in which the particular location of black women in dominant American social relations is uniquely and, in some sense, unassimilable into the discursive paradigms of gender and race domination"* (Collins, 2000: 68). Neglecting to realise the social construction of gender and race serves a narrow and limited analysis that refutes the genuine encounters of Black women's reproductive oppression (Crenshaw, 2005; Ross & Solinger, 2017). Often political organising around these issues treat gender and race oppression as an issue experienced by two separate groups; solutions need to address the intersections (Crenshaw, 2005). Importantly, women rely on interracial analysis to strengthen grassroots coalitions and make significant headway in ensuring reproductive justice (Crenshaw, 2005). A focus on variations in health within and between overlapping groups is critical when looking at heterogeneity in populations (Wemrell et al., 2021).

Reproductive Justice's ability to critique choice rhetoric so powerfully and, in turn, recognise the limitations of reproductive rights: that when grounded in individual decision-making they are simply stunted and unrealistic (Pogge, 2005), is promising. By adopting a human rights framework as opposed to reproductive rights, the movement applies principles of social justice and 'moral claims' which speaks more loudly (and broadly) to the reproductive oppressions experienced by minority and discriminated women. Finally, as an intersectional theory, it considers population heterogeneity. The movement however is still very much in its infancy and remains incomplete. For Ross, this is a significant strength; sitting at the edge of ambiguity offers versatility and welcomes elaboration (2017). Reproductive Justice, nevertheless, has a number of shortcomings; namely, although a moral indicator it cannot operate as an independent moral theory (Bailey, 2011), the issue of a rights rhetoric remains (Rebouche, 2016); and application to non-U.S. contexts requires further attention (Morgan, 2015).

2.3. Reproductive Justice: shortcomings

Firstly, while the Reproductive Justice movement has embraced human rights to produce a globally legible framework to communicate local concerns and hold states accountable, it has done so without

incorporating the same level of scepticism that Reproductive Justice had for the reproductive rights movement (Rebouche, 2016). Treating social justice and human rights as interchangeable concepts, Reproductive Justice assumes that human rights will supply a conception of radical law reform. Certainly, human rights have stimulated political and legal transformation in many places (Rebouche, 2016). Nonetheless, protecting human rights frequently relies on the courts and legal frameworks to develop their meaning (Rebouche, 2016). Reproductive Justice's use of human rights is, thus, polemic but immaterial. Human rights approaches are seldom concerned with economic and social inequalities unless they obstruct the attainment of human rights, or are subjected to differential treatment by the state (Chapman, 2010). Human rights laws only consider it problematic when there is inequality in the possession of rights rather than disparities in access to resources, social position, and political power (Chapman, 2010). Reproductive Justice, therefore perhaps, speaks more to social and structural determinants of reproductive health inequality, than providing a legal framework grounded in moral theory.

Outside the technicalities of *defining* human rights, a preoccupation with human rights matters for how one applies Reproductive Justice to specific contexts and issues. Reproductive Justice's advocacy of human rights often reflects US experiences and priorities (Rebouche, 2016) and it is important to consider the extent to which Reproductive Justice is appropriate outside of the U.S. context (Morgan, 2015). For example, Morgan (2015) noted how reproductive rights was the terminology used by feminists in Argentina. Argentine feminists were reluctant to abandon their language, given that they had worked long and hard to advance their rights from the state. Simply, the ways in which discrimination of gender, race, and class converge in Argentina is different to in the U.S., and Argentine feminists have been had a long-standing devotion to these intersecting oppressions. While their literature has certainly adopted the understandings of Reproductive Justice, rights rhetoric has still remained the most powerful tool in which Argentine women protect their reproductive health (Morgan, 2015). This is because their government was far more receptive to a reproductive rights approach; rights were and remain a powerful signifier of a post-dictatorship, and policies reflecting the advancement of women's reproductive autonomy (Morgan, 2015). Argentine feminist movements emanate from well-established Latin American social justice movements such as those addressing agrarian reform and peasant livelihoods, indigenous and Afro-descendant identity politics, liberation

theology, and the feminisation of poverty (Edelman, 2001), issues that a U.S. focus would fail to capture.

Perhaps most crucially is that, despite its name, Reproductive Justice should not be mistaken for a complete moral theory. While it identifies reproductive oppression along intersecting identities, work needs to be done in further articulate what “justice” in Reproductive Justice actually means (Bailey, 2011). Reproductive Justice does not provide a comprehensive explanation of why reproductive oppression is morally wrong and how reproductive services ought to be distributed fairly and hence falls short of functioning as a moral theory of justice (Bailey, 2011). Although a significant shortcoming, it can be attributed to the theory’s relative infancy and does not render it entirely inoperable. Raising questions regarding the lived reproductive experiences of women is an important contribution; alluding to injustice and oppression at individual and community levels goes far beyond previous developments in the reproductive health discourse. Reproductive Justice’s inability to answer the above questions alone, however, remains an issue.

In conclusion, the Reproductive Justice movement is providing a progressive perspective in the reproductive health discourse. It’s ability to operate as an intersectional methodology is its most promising contribution. The movement’s ability to attempt to provide a moral justification for why reproductive oppression is wrong is also promising, although it would be inappropriate to use it solely as an independent moral theory.

2.4. The Capability Approach

The capability approach is a normative framework in which to assess and evaluate individual well-being, poverty and inequality, policy and social change (Robeyns, 2005). Developed in its present form by Amartya Sen (1985; 1999; 2009), then by Martha Nussbaum (2000) and others including Ruger (2004; 2006; 2010) and Venkatapuram (2013; 2016) - the latter two applying the approach to health.

Capability is defined as the real opportunities an individual has to live the life they choose according to their everyday circumstances (Robeyns, 2005; Alkire, 2005; Patton et al, 2013). Capability links functionings and agency through the idea of choice and the ability to act with the potential for achieving desired ends (Robeyns, 2005; Ruger, 2010). Capability requires the ability to convert

resources into achieved 'functionings' (Ruger, 2010). Capability differs from natural or human endowments because it acknowledges and includes social determinants as part of its definition (Ruger, 2010).

Functionings are an individual's "being and doings" and refer to realised achievements. Wolfe and de-Shalit (2013) differentiate between *fertile functionings*, those that enhance positive functionings or minimise disadvantage, and *corrosive disadvantage*: the negative functionings that deepen other disadvantages. The capability approach is also interested in freedoms/agency. Used synonymously, freedoms/agency refers to an individual's ability to freely choose the functionings they have reason to value (Sen, 1999; Alkire, 2005). Individuals who have greater agency will live fuller, richer lives (Alkire, 2005). Specifically regarding health, Ruger's notion of health agency describes an "*individual's ability to act to achieve valued health goals*" (Ruger, 2006:79). Health agency includes health knowledge, health decision-making ability, and health norms, all of which influence an individual's capability for health (Ruger, 2006).

A key tenant of the Capability Approach is that individuals are entitled to live the life they have reason to value (Sen, 1999; Alkire, 2005). This is what defines a flourishing life and is the benchmark to measure societal success (Sen, 1999; Canoy et al., 2010). Rather than comparing preference satisfaction or resource allocation, the capability approach compares what individuals are actually able to be and do (Anand et al., 2005; Berges, 2007; Patton, 2012). This is not to say that resources are not important; individuals must have access to the resources required to make valued choices in their lives (Alkire, 2005). However, to focus solely on resource allocation is a misconception as it is the ability to use resources to achieve certain valued functionings that determines the worth of such resources (Berges, 2007; Patton et al, 2013). Importantly, required resources will differ according to individual's needs (Berges, 2007; Patton et al., 2013). In this way, the capability approach considers other facets, other than wealth, to an individual's wellbeing.

2.5. *Why apply the capability approach to reproductive health?*

There is increasing application of Sen's capability approach to reproductive health. The capability approach is widely recognised as a more realistic model over *equality of opportunity*, and *equality of outcome* models of justice. Equality of *opportunity* models are limited by the "inputs" for health and

pay little attention to whether a health outcome is actually achieved (Ruger, 2006). For example, equality of opportunity to health via healthcare is not enough to guarantee a woman's reproductive health. Just as education doesn't mean that all individuals will benefit from education, nor be able to convert the resources allotted by education to bring about the same or similar life advantages (Hart, 2012). Similarly, equality of *outcome* assessments may only focus on health outcomes, such as maternal mortality, omitting crucial data on maternal morbidity, quality of healthcare, experience of healthcare, and exercised reproductive autonomy. The capability approach, on the other hand, provides a realistic sense of what women are actually able to be and do, agency being its distinguishing feature (Ruger, 2004).

The capability approach can further address the limitations of Reproductive Justice. To reiterate, Reproductive Justice is about actual access to good health and exercised reproductive autonomy. It is centred on those experiencing the greatest barriers to reproductive freedom (Eaton & Stephens, 2020). "Choice" or "opportunity" does not describe all of women's experiences (Collins, 2000; Lopez, 2008). What reproductive justice can achieve is to understand how reproductive agency is stratified (Mann & Grzanka, 2018; Zucker, 2014). In many ways, health agency is what Reproductive Justice alludes to without explicit reference to the concept. The capability approach too, recognises that a woman's ability to be in good reproductive health is dependent on internal and external conditions (Ruger, 2010). Health agency is an individual's ability to achieve valued health goals (Ruger, 2006). Therefore, a capability approach to reproductive health aims to "*ensure the social conditions in which all individuals have the capability to be healthy*" (Ruger, 2006: 3). In this way the capability approach avoids individualistic rights rhetoric by focusing on women's freedom as the evaluative space of health justice; the central concerns of Reproductive Justice are best articulated through capability.

Akin to the above point, the capability approach strikes the delicate balance between paternalism (the practice of an individual or state interfering with the choices of another individual with the justification that the individuals or population will be better off or protected from harm) and autonomy (to live one's life according to one's reasons and motivations). Capabilities are ethically individualistic i.e. we are only interested in the effects of social affairs on individuals, and only individuals (Robeyns, 2002). But capabilities are also not ontologically individualistic in that they consider the social relations and cultural norms between people (Robeyns, 2002; DeJong, 2006). It accepts the importance of social

relations, structures, and institutions because of their influence on individuals' ability to convert resources into functionings (Robeyns, 2002). This is fundamental to reproductive health. Reproductive behaviour is far from an individual decision-making process, but influenced by institutions and social relations at multiple levels (Greenhalgh, 1990). Informal social networks, religious and kinship groups, and local political institutions are shaped by wider historical, economic, political and social processes (Greenhalgh, 1990). In this way, the capability approach allows for the assessment of a wider range of injustices, including the conditions impacting women's freedom, decision-making ability, knowledge, social norms and relations, including the structures within which resources and opportunities are distributed (Ruger, 2010).

And this is important. The capability approach is often criticised by Postcolonial scholars for being too individualistic and in turn "*tacitly accept[ing] neoliberalism*" (Piva da Silva, 2021: 5). The capability approach's intentionally vague position results in applications that avoid the influence of structure, power and domination on perpetuating inequalities (Sayer, 2014). These are, of course, the concerns of Reproductive Justice. In turn, it reduces the possibility to recognise plurality in non-western contexts (Charusheela, 2009; Comling and Sanchez, 2014). And yet women's reproductive autonomy is an incredibly individual and personal exercise. As the reproductive health discourse has shown, women's reproductive health has been co-opted by extreme natalist views and used as a pawn for economic, political, or environmental policy (Jayasundara, 2009), so to remember the individual at the centre is of critical importance. However, to reiterate, the capabilities approach is not ontologically individualistic meaning that although the primary focus is on the individual, structures are still important because they effect the individual (Robeyns, 2005). At the same time, the capability approach does not support individual's freedom with no regard for the outcomes of such freedom. Rather, freedom must be valuable in that it grants valuable health functionings (Ruger, 2010). In other words, the capability approach is more inclusive in recognising the dualism in reproductive health (*health and freedom*) but not promoting freedom so much that it cannot recognise the structural limits to freedom, and ultimately that a person's freedom must yield valued outcomes. Importantly, it considers deprivations in capability, rather than in resources or rights (Piva da Silva et al., 2021). Furthermore, it is the extensive scope of the capabilities approach that has led to the dialogue between theory and Reproductive Justice (Piva da Silva et al., 2021). Combining these theories allows for an exploratory analysis that may improve assessments of reproductive health inequity.

Finally, the capability approach can address the limitations of Reproductive Justice by providing an answer as to why reproductive oppression is wrong and how resources to avoid reproductive injustice should be distributed. The capability approach firmly states that the variable of evaluation should be the capability to achieve valuable functionings and therefore, reproductive oppression is wrong because it impinges on a woman's ability to achieve valuable functionings and to live a flourishing life (Sen, 1985; Ruger, 2010). Distributing services requires an assessment of shortfall equality, i.e. the extent to which individuals fall short of a threshold or health norm (Ruger, 2010). It is important to stress here, however, that the application of the capability approach to Reproductive Justice is merely a recommendation in the absence of some theoretical developments on part of Reproductive Justice. Continued theoretical development in the movement will reach their own important conclusions; in the meantime, the capability approach provides one suitable theoretical justification.

2.6. Applications of Capability Approach to Reproductive Health

Past research has acknowledged the above strengths of the capability approach to reproductive health. The majority of studies take the view of reproductive health as a capability to women's overall wellbeing and focus on the outcomes of reproductive health on wellbeing. DeJong (2006) examines the usefulness of the capability approach to reproductive health and asks whether it is particularly advantageous over disability-adjusted life years (DALY) assessments which are too disease-focused, and reproductive rights which are too individualistic. She argues that the capabilities approach offers an opportunity to address the social bases of health (including deprivation and poverty), and societal claims to social justice. Giving situation-based examples provides a useful evaluative space to consider women's reproductive health has central to their wellbeing. Nevertheless, the individual requirements to a capability to reproductive health are not identified.

More recently is Jayasundara's research (2013) empirically testing the efficacy of Sen's human development framework to address maternal mortality. This study evaluates the nuanced relationship between social development, reproductive freedom, and reproductive health, and concluded that maternal mortality through social development efforts, over economic development, has a greater impact on reproductive capability. However, this study provides a particularly weak and limited concept of reproductive capability. Only five variables compose her reproductive health capability (body mass index (BMI), anaemia level, knowledge of contraceptive method, knowledge of HIV, and

knowledge of other sexually transmitted diseases (STDs)). Reproductive Health Capability requires far more than just health status and health knowledge, and thus Jayasundara's index only provides a partial view of reproductive health capability. Despite the critical importance of agency to the capability approach, Jayasundara provides no explicit measure of agency. While we can infer 'agency' from three of the said indicators: knowledge of contraceptive methods, HIV, and STDs, they fail to fully capture women's ability to convert health resources into health functionings. Importantly, health decision-making and health norms are missing.

While plenty of research has applied capability thinking to gendered issues such as sex work (Patton et al., 2013) and women's wellbeing (Greco, 2018) research that considers the universal, intrinsic and instrumental capabilities to reproductive health is missing. I seek to develop a comprehensive and unifying conceptual framework of reproductive health justice. Such a framework will provide the grounds for better and equity driven policy.

2.7. Reproductive Health Capability: Selected capabilities

Health

Perhaps the most obvious capability to reproductive health is health itself. In a theory of health capability, health has special moral importance. Ruger justifies this position on the grounds of Aristotle's philosophical principle of "human flourishing": the ability to live a flourishing (and therefore healthy) life (Ruger, 2006). Flourishing and health are linked here because particular aspects of health maintain all other aspects of health functioning, and it is this ethical principle that obligates society in maintaining and improving health (Ruger, 2006). In essence, poor health is detrimental to a person's ability to live a flourishing life. That is not to say that health is synonymous with wellbeing or happiness, rather health is one of many capabilities to a flourishing life and in this way a meta-capability (Venkatapuram, 2011). Capability describes what individuals are actually able to be and do, providing a realistic sense of their freedom to seek the life they have reason to value (Ruger, 2007). Under this position, society has a moral obligation to avoid and alleviate loss in health functioning (Ruger, 2007). By explaining why health is of special moral importance we can in turn justify the moral importance to healthcare and the critical importance of meeting healthcare needs equitably (Ruger, 2007). Equally, why notions of health agency and broader social determinants are just as valuable (Venkatapuram, 2011; Ruger, 2010). That is because a capability to health is not just the ability to be in good health, but also to seek it (Ruger, 2010).

Returning to health status, Reproductive Health Capability is concerned with pregnancy-related health outcomes, specifically maternal morbidity indicators. It is becoming widely acknowledged that women who experience pregnancy or childbirth complications may continue to experience long-term issues such as depression, diabetes, and incontinence, impinging their ability to live a flourishing life (Filippi et al., 2018; Machiyama et al., 2017). Including maternal morbidity indicators also reflects both Global Health's and Reproductive Justice's advocacy for a life-course approach to reproductive health (Knaul et al., 2016; Ross, 2018). The WHO's Maternal Morbidity Working Group (MMWG) defines maternal morbidity as "*any health condition attributed to and/or complicating pregnancy and childbirth that has a negative impact on women's wellbeing and/or functioning*" (Chou et al., 2016: 16). The presence of maternal morbidity signifies a deficit of reproductive health capability.

Healthcare

Indeed, assessing health achievements alone is not enough to determine justice in health. Remember, the ability to be in, and seek good health is the measure of justice under a capability approach to health (Ruger, 2010). This capability will hence be dependent on a number of conditions. Healthcare is perhaps the most apparent. Under a capability perspective, healthcare also has special moral importance due to its role in influencing health (Ruger, 2003). Thus, healthcare is primarily instrumental: a means to an end of good health that must be socially guaranteed. The most pressing question here is *what type of care do we mean? And should policy prioritise quality over access?* The capability view of health does not specify which type of healthcare should be guaranteed and to what level (Ruger, 2010). Reproductive justice, however, has two helpful ideas on this issue. First, that access to comprehensive healthcare, including reproductive healthcare, is a human right, and second, this right to access must be achievable for all women (Ross & Solinger, 2017). Given the desire to avoid rights rhetoric, the health capability approach justifies equal access to healthcare by its impact on enhancing an individual's health capability. Similarly, quality of care is determined by its effectiveness in eradicating, preventing, and ameliorating deprivations in health functioning. Disparities in healthcare quality are a concern when they reduce an individual's capability to function; in short, poorer quality of care weakens an individual's capability for health functioning, and this is morally troubling (Ruger, 2005). Here, healthcare is focused on actual access to antenatal, delivery and postpartum care, whether this care prevented loss of functioning, and whether it was an empowering, discrimination-free experience.

Health Agency

World health deprivations would not simply diminish through accessible quality care however (DeJong, 2006). For Reproductive Health Capability, this means providing an alternative ethical aim: to ensure that social conditions facilitate a capability to be healthy (Ruger, 2005). By examining the social determinants of reproductive health, we can examine injustices besides the inequitable distribution of healthcare resources. Ruger therefore argues we must examine the extent to which society supports people's functionings, choices, and governing behaviours (2005). In other words, an individual's health agency; their ability to convert resources into valued health functionings. Ruger defines health agency as an *"individual's ability to act to achieve valued health goals"* (Ruger,

2006:79), and is comprised of health knowledge, health decision-making, self-management, self-regulation skills, the ability to navigate personal and professional situations in the pursuit of health, and the recognition that to be in good health is the right choice (Tellez Cabrera, 2021). For a capability to reproductive health, this also means having the power to decide about, and control matters associated with pregnancy and childbearing (Upadhyay et al., 2014). It is important to note that while all women need access to healthcare during pregnancy, pregnancy is also social. Often utilising healthcare services is dependent on whether a woman's social network supports and approves the pregnancy and whether they recognise the need for antenatal care (Haddrill et al., 2014). Many times, it may be acting according to a social norm rather than a rational belief in the importance of care (Haddrill et al., 2014). Thus, it is for this reason that health agency is not just active decision making, but must also include social norms and health knowledge. Just as critics of the ICPD affirmed, western feminists' tendency to equate reproductive autonomy with decision making ability neglects important structural and social barriers to reproductive autonomy. Moreover, an act of health agency must contribute positively to a woman's wellbeing. Remember, *"the value of freedoms lies in the functionings they permit, so freedoms have worth when they yield valuable health functionings"* (Ruger, 2010: 43). Therefore, health agency here is defined as: *the personal autonomy to achieve valued health goals and to act as an agent of one's own health* (Ruger, 2007; Drydyk, 2013).

Empowerment

A dimension of women's empowerment is critical to reproductive health capability. Empowerment is not *"expanded agency"* but rather a concept of relational power that determines a woman's ability to shape their life for the better (Drydyk, 2013). Empowerment may conceptually be concerned with women's bargaining power, greater decision-making ability, and spousal awareness of gender equity (Corron et al., 2014; Ying & Hui, 2011). Empowerment is important for reproductive health because empowered women are more likely to utilise healthcare services (Kumar & Tiwari, 2012), exercise reproductive autonomy (Loll et al., 2019; Dehlendorf et al., 2018), and navigate health seeking situations effectively (Ruger, 2006). It is important to note that empowerment is not reducible solely to gaining power, but better articulated through the power asymmetries between and within groups (Drydyk, 2013). Where power asymmetries exist i.e. an individual's opportunities are subject to the

choices made by others, a process of empowerment would entail a reduction in group subjection to dominance (Drydyk, 2013). Critically, a woman's agency may expand even within a disempowering context (Drydyk, 2013), for example, a woman may have greater contraceptive choices open to her, but she may be coerced into choosing a particular option decided upon by her partner. In this way, empowerment is also transformative, and unlike agency, refers to a process of change. As a process it is also scalar: some women may be more empowered than others (Drydyk, 2013). It is for these reasons why health agency is distinguished from empowerment. Particularly so as we aim to define the capability to valued functionings. A woman may have greater health agency, but if her conditions are not empowering, and she herself is not empowered, then we can presume the choices she makes will not necessarily be the ones she values, and thus her capability is deeply restricted.

Bodily Integrity

Bodily integrity contributes to enabling women to achieve reproductive justice's third and final right: *"the right to parent children in safe and healthy environments free from violence by individuals or the state"* (Ross, 2017: 290). Nussbaum actually includes bodily integrity in her list of ten capabilities, defined as, *"Being able to move freely from place to place; having one's bodily boundaries treated as sovereign, i.e. being able to be secure against assault, including sexual assault, child sexual abuse, and domestic violence; having opportunities for sexual satisfaction and for choice in matters of reproduction"* (Nussbaum, 2000: 78). Two critical elements are identified: *mobility*, and *protected bodily boundaries*. Indeed, these are components to be included in the dimension of bodily integrity. Freedom of movement includes concepts of agency and power; to move freely in spaces and to decide the actions we take in those spaces is, centrally, a reflection of power and (Hanson, 2010). Exercising mobility is fundamentally empowering (Hanson, 2010). The concept of bodily integrity, however, is more robust than freedom of movement (Shaw, 2019), and holds significantly greater intrinsic and timeless value. If empowerment is relational, transformational and **scalar**, bodily integrity is immanent and immutable.

However, Nussbaum also stated that *"having opportunities for sexual satisfaction and choices in matters of reproduction"* (2000: 78), is another component of bodily integrity. This is perhaps most similar to one's understanding of reproductive autonomy. However, as Herring & Wall (2017) argue, bodily integrity is non-reducible to the principle of autonomy. Exercising reproductive autonomy is to

decide the values and standards in which one wishes to live by, and then to have the ability to live by those values and standards (Herring & Wall, 2017). Bodily integrity, on the contrary, is “*the right to be free from physical interference*” (Feldman, 1993: 241), and, critically, protects women’s capability to reproductive health. Therefore, bodily integrity here is defined by women’s ability to exercise freedom of movement and to have her bodily boundaries treated as sovereign by both her partner and those around her. Greater bodily integrity protects women’s reproductive autonomy and enables her to make positive and health-promoting decisions regarding her reproductive health.

2.8. Concluding remarks

Reproductive Health Capability incorporates both health and freedom by assessing women’s capability to health, and thus offers a promising lens in which to measure (in)justice in reproductive health. I have outlined the strengths and weaknesses of Reproductive Justice and have supported the argument for a capability-based approach to reproductive health. While promising work has been completed in applying capability thinking to reproductive health, the majority of the work retains reproductive health’s importance on the basis of a capability to enhance wellbeing. While certainly the case, studies miss the opportunity to develop rich capability sets that outline exactly what is required for a woman to be and seek good health. There is a need for evidence-based health interventions that comprise a minimum set of essential capabilities that all countries should provide in developing the conceptual framework of Reproductive Health Capability, I have outlined the objective, relevant, and universal capabilities a woman requires in order to be in good health. I have proposed health, healthcare, health agency, empowerment and bodily integrity. This by no means an exhaustive list, and I welcome recommendations and debate on these capabilities. They are, however, compose the capability to achieve valued functionings; governments, policies, and health interventions must address each component in order to promote flourishing and just lives.

3.1 Introduction

Addressing reproductive health inequities requires careful measurement and monitoring of changes in disparities and their determinants (Braveman, 2006). Previous efforts to understand, measure, and improve population health have typically focused on national averages but more information to understand how health is experienced differently by population sub-groups is required (Hosseinpour & Bergen, 2019). It is the measurement of health inequities that generates critical evidence to inform equity-oriented policies and practices. Encouragingly, major global initiatives are beginning to recognise the importance of addressing inequities, improvements in '*narrowing the gap*' between disadvantaged groups is emerging as a hallmark of success (Hosseinpour & Bergen, 2019). Moreover, measurement of health inequities makes those that experience reproductive injustices legible to the state (Hosseinpour & Bergen, 2019). As Reproductive Justice reminded us, achieving reproductive health cannot remain a private matter; increasing legibility of health inequities creates opportunities to more effectively address these injustices and hold states accountable (Braveman et al., 2018). That's not to say that the benefits of making vulnerable populations legible to the state are always experienced, nor experienced equally (see Parry et al., 2019), they do however help uncover systematic oppression.

There are, of course, inevitable limitations of measurements of health inequity. Obtaining the data to effectively measure inequity are often timely and costly to disseminate (Singer, 2006). Further, the datasets can quickly become complicated by their exhaustive nature: multiple health indicators and their determinants disaggregated by different dimensions of inequality at various time points, all of which generates a great deal of data (Hosseinpour & Bergen, 2019). Most critically, the data alone rarely captures justice and careful handling of the data is often required to produce assessments of health inequity (Hosseinpour & Bergen, 2019). How one defines health equity matters for the utility of measurement (Braveman & Gruskin, 2003). Our definition of whether a source of inequality is illegitimate or ethically unacceptable is dependent on the justice theory used. In truth, there is no perfect theory of justice; each will place special moral importance on different aspects of health and each will contribute to identifying inequities. There may very well be disagreements on the normative end goal chosen as value-neutrality in health is not tenable, and certainly not in reproductive health

that is part of a wider goal of gender equity (Carter, 2018). Therefore, at the very least, we must be explicitly open about how we judge an inequality to be morally troubling (Carter, 2018).

The previous chapter has identified the capability approach as the superior framework in which to assess equity in reproductive health. Using a concept of equity means one can measure the differences in health between social groups, have a reason for why reproductive injustice is morally wrong, and provide accountability for the effects of actions (Braveman & Gruskin, 2003).

Household surveys provide a main source of data for measuring health inequality. The Demographic and Health Survey (DHS), in particular, is an important source of data on health and families in developing countries (Ties Boerma & Sommerfelt, 1993). DHS surveys provide data on fertility and family planning, mortality and nutrition, and healthcare utilisation, at both the national and international level (Ties Boerma & Sommerfelt, 1993; Murray et al., 2004). While there are additional country-specific modules, the majority of the survey is uniform and standardised to allow for detailed international and subnational comparisons of health status, healthcare, and additional social determinants (Ties Boerma & Sommerfelt, 1993; Murray et al., 2004).

Colombia has been chosen as the case study in which to apply the empirical assessment of Reproductive Health Capability. As a high middle-income country, Colombia has shown significant improvements in reproductive health indicators. For instance, in 2015, Colombia reported 64 maternal deaths per 100,000 live births (WHO, 2015). Frequently cited drivers of change include improvements in social determinants (i.e. education of women, poverty, fertility and urbanisation), development of unified health systems with geographical targeting for primary care and additional disease-specific programmes, and non-health-sector interventions such as cash transfers and improved water and sanitation (Alvarez et al., 2011).

However, the latest health analysis in Colombia also shows states such as La Guajira and Choco are two regions with particularly high mortality ratios 224.61 and 135.81 per 100,000 live births respectively (Ministerio de Salud y Protección Social, Dirección de Epidemiología y Demografía, 2014). These two regions are noted as the most rural and dispersed areas (Rivillas et al., 2020). Furthermore, these regions have the highest concentration of maternal deaths among Indigenous and Afro-Colombian women (Ministerio de Salud y Protección Social MSPS, 2014; Rivillas et al., 2020).

Armed conflict has led to widespread violence and mass internal displacement which has exacerbated enduring inequalities (Andrade Salazar et al., 2017).

In brief, Colombia's health system is made up of both a private and a social security sector; the "backbone" is the General Social Security Health System. It is made up of two plans: a *contributory* plan which covers salaried, independent workers, and pensioners, and a *subsidised* plan covering those who cannot pay (Ministerio de Salud y Protección Social (Colombia), 2014). It is compulsory and while it has resulted in overall population-level improvements, it remains deeply fragmented (Levino & Carvalho, 2011).

In this context, Colombia makes an interesting case study in which to explore reproductive health capability. Furthermore, current empirical research on health inequalities in Colombia have often been analysed from the perspective of access and utilisation of healthcare services (Rivera, 2017), notions of reproductive autonomy and health justice have not been the focus of analysis. Importantly, the concept of health agency has not been, to date, incorporated into an empirical measure. Colombia is a significantly unequal country, and these inequalities do not exist alone, but along intersectional positions. There is also recent data available from the DHS, collected in 2015. To my knowledge, there has been no previous research that has investigated the empirical assessment of capability to reproductive health. The aim of this chapter is to explore whether the DHS can be repurposed to measure reproductive health capability, using the conceptually-derived dimensions identified in the previous chapter. From this, I investigate what Reproductive Health Capability looks like for women in Colombia. This exploratory data analysis aims to provide the beginnings of a workable empirical assessment of reproductive health inequities.

3.2. Methods

3.2.1. Development of conceptual model

Capabilities that compose the conceptual model were identified through review of Reproductive Justice, ICPD, and Ruger's Health Capability literature. Capabilities were predominantly derived from Ruger's Health Capability, those including Health Status and Health Agency. Indeed, Ruger's Health

Capability was not developed for reproductive health specifically, and so the propositions identified by Reproductive Justice and the ICPD were used to better articulate Healthcare, Empowerment, and Bodily Integrity. Nevertheless, the main tenet of Ruger's Health Capability – that, women must have the freedom to be in good health and to seek it – is extremely relevant to reproductive health. Thus, Health Capability's premise of freedom remains in the development of the conceptual framework.

Avoiding maternal morbidity prevents experiences of long-term issues such as depression, diabetes, and incontinence, impinging their ability to live a flourishing life (Filippi et al., 2018; Machiyama et al., 2017). Including maternal morbidity indicators also reflects both Global Health's and Reproductive Justice's advocacy for a life-course approach to reproductive health (Knaul et al., 2016; Ross, 2018). Access to quality healthcare greatly reduces morbidity and mortality for mostly preventable sexual and reproductive health problems (Firoz et al., 2018). Many women die during childbirth because a skilled birth attendant is not present, and lack of information on healthcare and prevention, contraception, and sexuality limit women's ability to exercise their reproductive freedom (Geller et al., 2018). Health agency, importantly, enables women to achieve their reproductive intentions (Ickes et al., 2016) and increase their healthcare-seeking behaviour (Wado, 2016). Younger women and mothers are particularly vulnerable and have less agency over their reproductive health. They often receive less education about reproduction and sexuality than boys, they are more vulnerable to situations where they have less control over their reproductive decision-making (Santhya et al., 2010), and these instances of unsafe sex are exacerbated by high risks of intimate partner violence (BMJ, 2020). Intimate partner violence in pregnancy may result in injury related deaths in pregnancy, or miscarriages, preterm labour, stillbirth, low birth weight and foetal injury, and pregnancy related complications (Alhusen, 2015). Empowerment is important for reproductive health because empowered women are more likely to utilise healthcare services (Kumar & Tiwari, 2012), exercise reproductive autonomy (Loll et al., 2019; Dehlendorf et al., 2018), and navigate health seeking situations effectively (Ruger, 2006).

Additional capabilities were considered including personal and household financial resources, and nutrition. From a conceptual perspective, personal and household financial resources were not included because, as Sen and Ruger argue, reducing poverty and increasing income is not the sole purpose of human welfare, and improving human wellbeing can be attained through social

development. To improve women's capability to health, governments must look beyond household income and towards creating a society that values women's health, providing accessible and affordable healthcare, and eliminating all forms of violence against women. Simply, increasing personal wealth does not guarantee women's capability to health. The critical importance of mother's nutrition during her pregnancy is widely acknowledged (see Henriksen, 2006; Ho et al., 2016; Koletzko et al., 2019) and was thus considered in the construction of Reproductive Health Capability. However, due to lack of data regarding mother's nutrition and food intake, it was decided not to include this as an additional dimension, the limitations of this are further discussed in Section 4.2.

3.2.2. Description of overall construct

Each capability is of equal importance and together composes a multidimensional framework best representing the capabilities a woman needs in order to be in and seek good reproductive health. All capabilities are interlinked whereby the achievement of one affects the achievement of the other. They are, however, distinct concepts that articulate the very important resources needed to achieve reproductive health.

3.2.3. Data and study population

This study uses data from the DHS Household module, Women's module, and the additional Domestic Violence module conducted in Colombia 2015. The DHS is a cross-sectional household survey designed to collect nationally representative estimates of population and health indicators (see <https://dhsprogram.com/methodology/survey/survey-display-476.cfm>). It comprises six questionnaires: the household module, the women's module, the men's module, the biomarker module, the fieldworker module, and the verbal autopsy module. The DHS uses a probabilistic multi-stage stratified cluster sampling technique to ensure it is representative at the country-level, for 6 geographic regions including Colombia's capital Bogota (Atlantic, Western, Central, Pacific, Amazon), their 32 departments (sub-regions or states), and urban and rural areas (Ministerio de Salud & Profamilia, 2015). A three-stage sampling strategy was used in urban areas where wards are selected as primary sampling units (PSUs) in the first stage. In the second, one enumeration area (EA) was selected from each PSU, and finally, households were selected from sample EAs. In rural areas, wards were selected as PSUs in the first stage and households finalised in the second stage. Eligible

women aged 13-49 in the sample households were identified and face-to-face interviews were conducted with structured questionnaires. The household module covers household characteristics for usual members and characteristics of the household dwelling unit. The women's module collects information from women aged 13-49 on a range of background characteristics, fertility preferences, reproductive history and child mortality, knowledge and use of family planning methods, and antenatal, delivery and postnatal care. The domestic violence module is an optional module of questions for women currently married, divorced, widowed or separated, and covers violence perpetrated by current, or most recent partner or husband (Croft et al., 2018). The DHS 2015 sample included 92,799 individuals, 44,614 households, and 38,718 women. As Reproductive Health Capability for women who have recently given birth was being measured, the criteria for inclusion were: those who had given birth in the last 5 years, were in a union, and those selected for the domestic violence module and had obtained privacy for interview. Our final sample included 7,225 women.

In accordance with Reproductive Justice, women's healthcare needs must include the full range of reproductive health services, from contraception to reproductive cancers. Existing instruments for assessing country-level reproductive health outcomes typically aggregate the main reproductive health issues into single overall scores. For example, the WHO's shortlist of reproductive health indicators includes seventeen indicators covering maternal mortality, obstetric care, perinatal health, STI prevalence, and knowledge of: infertility, anaemia, and female genital cutting (FGM) (WHO, 2006). While no doubt valuable, combining these issues into a single overall instrument results in only a couple of items to represent complex reproductive health concerns, all of which include an important wellbeing aspect. Indicators of reproductive dignity, quality of healthcare, and patient experience are neglected in favour of biomedical indicators. It was thus decided to focus on reproductive health issues individually, providing a list of relevant and informative items for specific reproductive health issues. For this study, maternal morbidity was selected due to data availability; a large sample size and relevant indicators of Reproductive Justice and Health Capability. It is worth noting that the DHS has many useful and relevant questions for contraception and fertility preferences; maternal morbidity was also chosen due to time restraints.

In regard to generalisability of the final empirical model, the instrument provides reliable analysis of maternal morbidity and justice at the population level across countries, it is not however generalisable across other reproductive health issues. The proposed list of indicators from this study should be understood as a list of relevant indicators for women's capability to maternal health specifically.

Social characteristic variables were extracted from the household module chosen because they are well-known determinants of health inequity. Further detail on these chosen social characteristics is given below. Although this exploratory analysis does not consider the associations between these characteristics it is acknowledged that they are not independent of one another.

To protect the security of women, special training was provided to interviewers for the domestic violence module in line with World Health Organisation's ethical guidelines (WHO, 2001). Additionally, women were only interviewed where privacy was obtained, and only one randomly selected eligible woman within each household was selected for interview.

Permission was granted by the DHS for use of data on 15/09/2020. Statistical analysis was run in R version 4.0.2 (The R Project for Statistical Computing).

3.2.4. Variable Selection

- *Survey deconstruction*

To identify a minimal set of concise and informative measures of Reproductive Health Capability, the DHS survey was deconstructed and potential variables were assembled around our theoretically-derived dimensions. Variables were selected based on their relevance to our dimensions, using past research, theory, and recommendations from the World Health Organisation (WHO) and Colombia's Ministerio de Salud y Protección (MINSALUD, Ministry of Health and Social Protection).

For empowerment, the DHS collects a wealth of information on women's status (Basu & Koolwal, 2005). Indicators of empowerment covered in the DHS include household decision-making, opinions of justification for wife-beating, freedom of movement, healthcare decision-making, gender-role opinions, and economic independence. Previous research selects variables based on theories of empowerment and cultural contexts. Recent examples that have used DHS survey data to assess women's empowerment include Yaya et al., 2018; Rettig et al., 2020; and Whidden et al., 2021.

The concept of health agency has received less attention in empirical measurement (Hitlin & Elder, 2006; Kristiansen, 2014); the DHS does not explicitly refer to health agency. Rather, research typically measures empowerment, presuming that the empowered woman is the autonomous woman, and operational research tends to use these terms interchangeably (Basu & Koolwal, 2005). Typically, research uses health decision-making indicators and includes this within an index for empowerment. Thus, Ruger's (2005) health capability theory was used to guide the initial selection of variables, including additional indicators of health knowledge and health norms.

Regarding bodily integrity, the DHS's domestic violence module explicitly covers physical, emotional, and sexual abuse experienced by a current partner, or former partner if divorced, separated, or widowed. All variables were initially selected.

For healthcare, variables associated with access to quality antenatal, delivery, and postnatal care were selected. For antenatal care, the DHS covers the type of provider (i.e. doctor, nurse, midwife, auxiliary nurse, community health worker, other health workers, traditional birth attendant, or other), the number of visits, months pregnant at the first visit, and whether the respondent received specific components of antenatal care. For delivery, the DHS covers the place of delivery and delivery assistance. For postnatal care, the DHS covers the timing of the first postnatal check for mother and child, type of provider for mother and child, and whether the new born received selected functions of postnatal care.

Finally, maternal morbidity was used to define reproductive health status. The DHS covers complications during pregnancy, and during and after delivery. All variables were selected.

- *Recoding variables*

Variables were re-coded as follows:

Original DHS response coding of 1 = No and 2 = Yes was retained in all binary responses.

Ordinal variables, of which there were several, took specific re-coding. For questions asking respondents for their decision making capability, DHS coded responses as 1 = no one, 2 = respondent alone, 3 = respondent and husband/partner alone, 4 = respondent and other person, 5 = husband/partner alone, 6 = someone else, and 7 = other. These responses were re-coded into 4

ordinal categories whereby a code of 4 represented optimum decision-making capability such that 1 = no decision making (“someone else”, “other”, “no one”), 2 = husband/partner alone (“husband/partner alone”), 3 = jointly (“respondent and husband/partner”, “respondent and other”), and 4 = woman alone (“respondent alone”).

For statements on gender role opinions, respondents are asked whether they agree, disagree, or neither. DHS codes answers as 1 = disagrees, 2 = neither agrees nor disagrees, and 3 = agrees. These original codes were retained if the variable reinforced an empowering statement (see Appendix 7, statement “*A woman can choose her friends although her partner doesn’t like it*” highlighted in purple). For disempowering statements, such as “*men are the head of the household*”, responses were re-coded such that 1 = agree and 3 = disagree.

All nominal variables were re-coded to ordinal variables such that a higher code represented a more desirable score. For delivery postpartum variable “Where did the delivery take place?” (m15_1), the DHS response codes are as follows: 2 = respondent/other’s home, 4 = government hospital/health centre/ health post, 6 = private hospital/clinic, 7 = eps health centre, and 8 = other. These were re-coded where 1 = respondent/other home, other, 2 = government hospital, Private hospital, Eps health centre (i.e. a non-institutional delivery, and an institutional delivery).

Similarly for variable “Who checked your health at that time?” (m68_1) the DHS codes responses as 2 = doctor, 3 = nurse/midwife, 4 = aux midwife, 6 = traditional birth assistant, 8 = other. These were re-coded to 1 = traditional birth assist, other 2 = doctor, nurse, midwife, aux midwife (i.e. non-health professional, and a health professional). Again, for “Where did this take place?” (m69_1) the DHS codes responses as 5 = government hospital, 7 = private hospital, 8 = eps health centre, 9 = private doctor, 10 = profamilia, and 11 = other. These were re-coded we 1 = profamilia, eps health centre, other, and 2 = government hospital, private doctor.

Several continuous variables were included in assessing healthcare. Continuous variables include the number of antenatal visits, timing of the first visit, and number of tetanus vaccinations given during pregnancy. At least 8 visits, with the first contact within 20 weeks of gestation, are recommended by the WHO (2016). Number of antenatal visits variable (m14_1) was recoded as 1 = 0-7 and 2 = 8+. Timing of visits (m13_1) was recoded so that 1 = 7-9 months, 2 = 4-6 months, 3 = 0-3 months. The

WHO also recommends a total of 5 doses of tetanus toxoid immunisation to protect throughout the childbearing age (2016). This variable (m1_1) was recoded so that 1 = 0-4 and 2 = 5+.

Any missing data took the model response.

- *Removing variables*

After our long list of variables had been selected and re-coded, several procedures were undertaken to reduce our variables including assessing descriptive statistics, polychoric correlations between variables, and factor analysis. The use of factor analysis to remove variables ensured a consistent and robust group of variables that could be observed over space and time (Floyd, 1995).

1. Descriptive Statistics

Descriptive statistics of our long list of variables were assessed and variables were removed according to missing data, skew, and kurtosis. Variables where >10% of sample size responses were missing were removed first. Skew (> 4.0) and kurtosis (>6.5) were assessed simultaneously. Variables with high skew and kurtosis were identified but not necessarily removed at this stage (see Appendix 7 for example of item removal).

2. Correlation Matrix

Next, variables were removed in accordance to correlation matrix results. As our data are composed of mixed data types a polychoric correlation matrix was used. Variables with correlations > 0.7 were identified and considered for removal. Only variables highly correlated with several other variables were removed. Variable removal at this stage was assessed in conjunction with Factor Analysis. Variables with weak or no association with the underlying concept were removed and/or supported removing highly correlated variables.

3. Factor Analysis

Factor Analysis was used to assess whether our potential variables were associated with our underlying theoretically defined dimensions. A separate factor analysis was conducted for each dimension.

To ensure factor analysis suitability, selected variables underwent a Kaiser-Mayer-Olkin (KMO) test. The KMO test measures sampling adequacy in terms of the distribution of values. Values above 0.5 were deemed acceptable.

Very Simple Structure, Parallel Analysis, and nfactors were used to determine the optimal number of factors. Ordinal plots with the recommended number of factors were produced. Any variables that were not associated with the underlying concept were removed. An Oblimin rotation was used in the factor analysis to simplify the structure of underlying dimensions. The final number of variables selected for each dimension were as follows: health status = 12, healthcare = 17, health agency = 16, empowerment = 12, and bodily integrity = 13.

3.2.5 Aggregation and weighting of scores

With our selected variables a cumulative score for each woman for each dimension was calculated. Because our variables were measured on different scales, all variables were standardised before calculating overall dimension scores. Min-max normalisation was completed according to a standard function which rescales the original values of our variables into numbers ranging from 0 to 1. Variables were aggregated into a total ranging from 0 to the maximum number of variables that composed each dimension. Note, for dimensions Health Status and Bodily Integrity, scores were reversed such that 1 = non-experience of health complication or violence, and 0 = experience of health complication or violence.

To calculate an overall score for Reproductive Health Capability, min-max normalisation was used to standardise dimension scores. All dimensions contributed equally to the overall index and retained their value of 1. There are various methods of weighting; equal weighting was decided upon due to simplicity, flexibility, and to provide an objective view (Decancq & Lugo, 2012; Greco, 2018). Dimension scores were aggregated into a total of 5. A high score represented a higher level of Reproductive Health Capability.

3.2.6. Reliability and Validity of Index

Assessing the validity and reliability was crucial. Our measures should be found to be valid (how well the indicator measures what it is supposed to measure) and reliable (the degree to which the instrument is free from measurement error).

To assess the reliability of our index, Cronbach's alpha was calculated to test the internal consistency within each dimension. Nunnally & Bernstein (1994) has proposed 0.7 as a minimum alpha (Table 1). Additionally, a correlation matrix was used to test the internal consistency across dimensions, measuring the direction and magnitude of linear relationships between them. Because our data did not show bivariate normal distribution, Spearman rank-order correlations were calculated between dimensions.

Table 1. Cronbach's alpha acceptability threshold.

$\alpha \geq 0.9$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

To assess the validity of our index, known-group analysis was used. Known-group analysis presumes a particular group identified by a unique characteristic will score differently from other groups (Eagly & Chaiken, 1993). This theoretical construct is used to anticipate how different groups are likely to behave, if the test results support these known differences, the validity test is positive (Greco, 2018). Known-group analysis is the most commonly accepted evidence in support of construct validity (Portney & Watkins, 1993). This method was chosen because it was possible to separate our sample according to the presence or absence of particular characteristics.

Box plots, histograms, and a general linear model (GLM) were used to assess known-group analysis. Our chosen group characteristics were age, ethnicity, region, education, and place of residence. These social characteristics are known to be major determinants of health inequality in Colombia. The following characteristics will be described in more detail, outlining our hypotheses, and how this study characterises these variables.

Age

Previous research indicates that both adolescent mothers and delayed childbearing have a greater risk of preterm delivery, low birth weight, low Apgar scores, and perinatal mortality; and increased prevalence of caesarean sections among older mothers (Gibbs et al., 2012; Kenny et al., 2013; Lean et al., 2017; Fuchs et al., 2018). It is still debated whether this association is explained by socio-economic disadvantages, lack of access to high-quality antenatal care, behavioural factors, or biological vulnerability (Chen et al., 2007; Malabarey et al., 2012; Londero et al., 2019).

Jaramillo-Majja & Chemichovsky (2019) found that adolescent mothers had fewer antenatal visits than mothers aged 20-35, and received inferior attention during delivery. It is often reported that older women's needs are not met in healthcare encounters; lack of active patient participation is a major reason for dissatisfaction (Bamgbala et al., 2004; Arango et al., 2016). This would also suggest empowerment and health agency are important determinants to receiving quality healthcare and that older women may report lower levels of empowerment and health agency.

In regard to empowerment, presumed economic and social advantages for older women are not conclusive, and previous research notes the effect of age on empowerment is negative (Roy & Chaudhuri, 2008; McHugh, 2012). Cultural change may be one explanation; for example, younger generations may have greater access to education, empowerment initiatives, receive better sex education and grow up in a more tolerant, health, and egalitarian promoting society (Drewry & Garces-Palacio, 2020). The general pattern presented in past research shows a positive diminishing marginal effect of age on empowerment; levels of empowerment are higher for women in their mid-20s to 30s but become less prevalent as women grow older. Adolescent women are found to be less empowered (McHugh, 2012).

Accordingly, it is hypothesised that women between 25-35 years old will record higher scores for empowerment, health agency, and access to health than for older women. Adolescent mothers and mothers above 45 are more likely to record lower reproductive health scores. In regards to bodily integrity, I hypothesise younger women will record lower scores of bodily integrity. This variable was categorised into age groups: 13-19; 20-24; 25-29; 30-34; 35-39; 40-44; and 45-49 years old. Note;

only three women were aged 13-14 in the original DHS age group, thus were combined to form a 13-19 age group.

Ethnicity

Ethnicity is another important determinant to women's reproductive health. Maternal mortality for the indigenous community was 327.5 per 100,000 live births between 2011-2013 in Colombia, compared to 60.9 for the non-Indigenous population (Bello-Alvarez et al., 2017). Additionally, of the maternal deaths that occurred in the indigenous population, proportionally more were for adolescent mothers, and mothers over the age of 35 (Bello-Alvarez et al., 2017). This indicates reproductive health inequality occurring at intersecting identities. Mesenburg et al., (2018) finds that coverage of antenatal care, skilled birth attendants, and modern contraception in most Latin American countries was lower among indigenous women than White and Afro-Colombian women. Even after adjusting for residence, wealth, and education, ethnic/racial differences persist (Mesenburg et al., 2018).

Nevertheless, indigenous and Afro-Colombian women are more likely to be less educated, to own land, and receive lower incomes (Melo, 2015). Moreover, organisational and male violence within Indigenous communities is associated with ancestral patriarchal attitudes (Martinez-Restrepo & Ramos-Jaimes, 2017). A legacy of armed conflict has impacted Afro-descendent women in Colombia in particular (Goldscheid, 2019). A history of colonial oppression, recent agrarian transformations and migration and rapid urbanisation (among other transitions) that have led to social exclusion of many ethnic minority women are frequently cited explanations for such inequalities (Melo, 2015; Berkman, 2007; Hernandez & Titheridge, 2016).

It is thus expected that indigenous women will have significantly lower scores in all dimensions compared to non-indigenous women. Afro-Colombian women will report scores higher than indigenous women, but lower than White women. The Colombian DHS aims for stability and offers only crude and rigid categories and asks respondents for their self-identification as a member of a specific ethnic group (Burton et al., 2010). These are inherently contextual, historical, and flexible, and the limitations of such a method are well acknowledged (Bradby, 2010; Saunders et al., 2013; Anderson et al., 2016). For this study, women's ethnicity was categorised as White/other, indigenous, and Afro-descendent.

Education

Despite strong theoretical foundations, the relationship of education and sexual and reproductive health indicators is inconsistent (Psaki et al., 2019). Psaki et al.'s (2019) meta-analysis of 35 papers found that although the majority of studies report evidence of a causal relationship between sexual and reproductive health outcomes and education, the estimated effects are often small. It is postulated that education has positive effects on changing preferences (fertility and timing of marriage for example) and on changing women's and men's abilities or opportunities to achieve their preference (income, knowledge and use of contraception (LeVine et al., 2011). Although whether this is a causal relationship is still not fully understood.

However, evidence for the association between education and empowerment indicators is more conclusive. Evidence shows how education expands opportunities to engage in the labour market (Jejeebhoy 1995), become economically independent (Botello-Penalozza & Guerrero-Rincon, 2017), and increase autonomy over their lives (Iregui-Bohorquez et al., 2019). Moreover, education has also been shown to contribute to women's intrahousehold bargaining ability. Education provides the opportunity for cognitive development to communicate, analyse, and negotiate their situations (Panda & Agarwal, 2005; Jones & Ferguson, 2009; Friedemann-Sanchez & Lovaton, 2012).

Therefore, it is hypothesised that women with greater education will report higher scores for empowerment. It is also expected women with more education to report higher scores of health agency, and in turn, healthcare. I would expect greater, albeit marginal, health status scores for women with higher education. This variable was defined into the four categories of no education, primary, secondary, and higher education. In Colombia, education is compulsory from 5-16 years of age.

Region

The DHS defines six regions including Atlantic, East, Central, Pacific, Bogota, and Amazon/Orinoco (Table 2).

Table 2. The DHS defined six regions of Colombia and their composing subregions.

Region	Subregion
<i>Atlantic</i>	Guajira, Cesar, Magdalena

	Barranquilla, Atlántico sin Barranquilla
	San Andres, Bolivar Norte
	Bolivar resto, Sucre, Cordoba
<i>East</i>	Santanderes
	Boyacá, Cundinamarca, Meta
<i>Bogota</i>	Bogota
	Medellin
<i>Central</i>	Antioquia sin Medellín
	Caldas, Risaralda, Quindío
	Tolima, Huila, Caqueta
	Cali
<i>Pacific</i>	Valle del Cauca
	Cauca y Nariño
	Litoral Pacifico
<i>Amazon/Orinoco</i>	Arauca, Casanare, Guainia, Vichada, Amazonas
	Putumayo, Guaviare, Vaupes

Research shows various levels of development in Colombia (Fergusson et al., 2017). Notably, the Amazon, Pacific and Caribbean regions are associated with more insecure and poorly defined rights, more violence, and less public good provision (Pinzon-Florez et al., 2017). Regional inequality is often cited as the result of a colonial de-centralised state where worse economic and political institutions are found in regions that typically had a smaller governmental presence (Fergusson et al., 2017).

Less public good provision has led to inequitable access and utilisation of healthcare by pregnant women (Rivillas et al., 2020) and thus, regional inequality in reproductive health outcomes. Pinzon-Florez et al. find states Guainia, Choco, Vaupes, Amazon and La Guajira (located in the Amazon, Pacific and Caribbean regions) have the poorest social conditions and highest maternal mortality rates (2017).

Additionally, gender stereotypes based on Colombian regional cultural dimensions are noted as significant determinants of poorer levels of empowerment and bodily integrity (Penaloza et al., 2020). For example, previous research has shown the Caribbean region of Colombia as a region with an entrenched culture of *machismo*; defined by limited communication around sexual health and intimacy, and low empowerment in negotiating sexual relationships (Marrugo et al., 2004).

Therefore, it is hypothesised that Orinoco/Amazon, Pacific, and Atlantic regions perform worse in all dimensions. Bogota and the Central regions will perform better in all dimensions. However, I expect to see smaller variations in healthcare and health status dimensions between regions but greater variations in empowerment, health agency, and bodily integrity.

Residence (Urban or Rural)

Reproductive health inequalities do not occur by chance but coincide with an established pattern of social structure and organization that often manifests itself spatially. An urban bias is observed in Colombia where maternal mortality is higher in rural regions (Rodriguez-Pineda et al., 2020), although significant internal economic and conflict-driven migration has exacerbated health inequalities within urban areas (Ibanez & Moya).

Accordingly, general patterns found in previous research are that urban areas are more likely to have greater access to quality care (Garcia, 2020; Drewy & Garces-Palacio, 2020; Hawthorne & Kwan, 2012). Greater wealth concentration and favourable policies may explain this “urban advantage” (Garcia, 2020). Colombia, specifically, has accelerated the expansion of their larger cities, therefore increasing the economic weight of major cities and extending their areas of influences (Garcia, 2020). Moreover, literature notes a particular culture of rural society which promotes motherhood and caretaking responsibilities for women and limited paternal responsibility for men (Valencia et al., 2013). The cultural context has contributed to many rural adolescent women having limited reproductive and sexual autonomy, and broadly assigning contraceptive responsibility to men (Soto Lesmes et al., 2010).

Therefore, I hypothesize that urban women are more likely to report higher scores in all dimensions. I posit that differences between rural and urban women in the healthcare dimension are not too great given Colombia’s universal health care system. I also hypothesise that rural women are more likely to experience violations of their bodily integrity, whether that be from a partner or violence inflicted by non-domestic partners.

3.2.7.. Socio-demographic variables

The socio-demographic characteristics of the sampled women are presented in Table 3. 67% of sampled women lived in urban areas. Just over half (52.1%) of women were in their 20s, compared to 8.9% adolescents; 32.4% in their 30s, 6.7% in their 20s. The majority of sampled women lived in the Atlantic region (29.2%). Majority of sampled women reported secondary education (49.6%) as their highest level of formal education; only 2.7% of sampled women had no formal education.

Table 3. Socio-Demographic variables and percentages for sampled women

	n	%
Age		
13-19	645	8.9
20-24	1868	25.9
25-29	1890	26.2
30-34	1525	21.1
35-39	816	11.3
40-44	380	5.3
45-49	101	1.4
Education		
No education	199	2.7
Primary	1488	20.6
Secondary	3582	27.1
Higher	1956	49.6
Ethnicity		
White/Other	5367	74.3
Indigenous	1064	14.7
Afro-Colombian	794	11.1
Region		
Atlantic	2113	29.2
Oriental	954	13.2
Central	1381	19.1
Pacific	1091	15.1
Bogota	395	5.5
Amazon	1291	17.9
Place of residence		
Urban	4838	67
Rural	2387	33

3.3. Results

This section presents the results from developing the measure of reproductive health capability: (1) selection of variables and internal consistency within dimensions, (2) internal consistency between dimensions, (3) and external validity.

3.3.1. Selection of Variables

1. Health Status

Twenty-six variables from the Colombian 2015 DHS selected as potentially relevant to health status, and basic statistics were calculated for each (mean, standard deviation, skew, and kurtosis (Appendix 1). Fourteen variables were removed due to $\rho > 0.7$, and all related to assessing prenatal complications. The overall Kaiser-Meyer-Olkin (KMO) value was 0.76, above the threshold indicating variable robustness and sample suitability for Factor Analysis (Streiner & Streiner, 2016). *Very Simple Structure (VSS)*, *nfactors*, and *parallel analysis* recommended two factors. As such, ordinal omega plots were created using a 2-factor solution (Figure 1a).

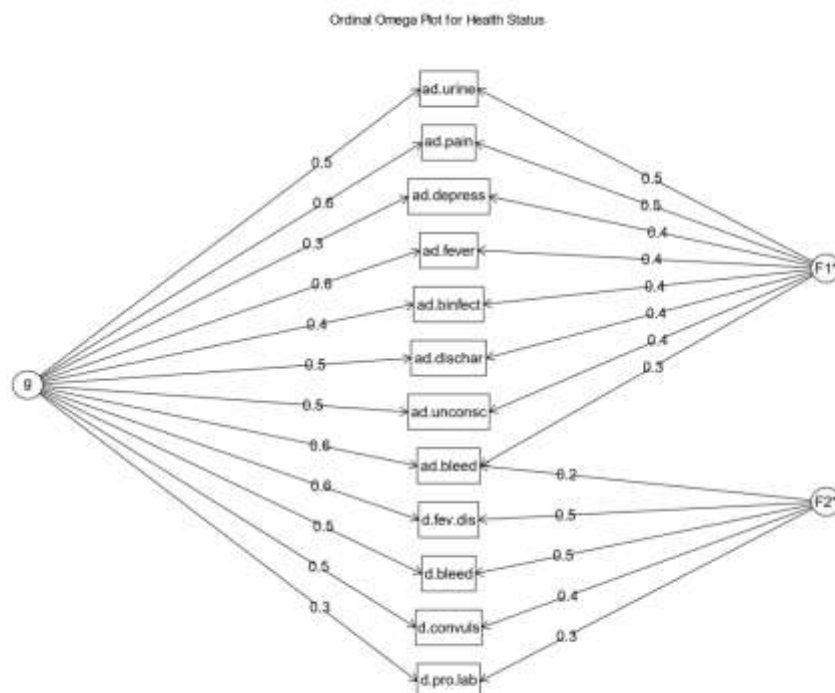


Figure 1a. Ordinal Omega Plot for health status dimension with 2-factor solution. Factor 1 can be identified as complications during delivery; Factor 2 can be identified as complications after delivery.

The final selection of variables is presented in Table 4, including DHS codes, labels, and mean scores for each variable. They include variables assessing *complications during delivery* and *complications after delivery* only, *complications during pregnancy* variables were removed because they showed a weak correlation (<0.3) with the underlying concept in the Ordinal Omega plots. Figure 1b presents the Ordinal Omega plot for all shortlisted health status variables; lines on the left connecting 'g' to variable labels represent the correlation between them. Correlations <0.3 are considered weak. .

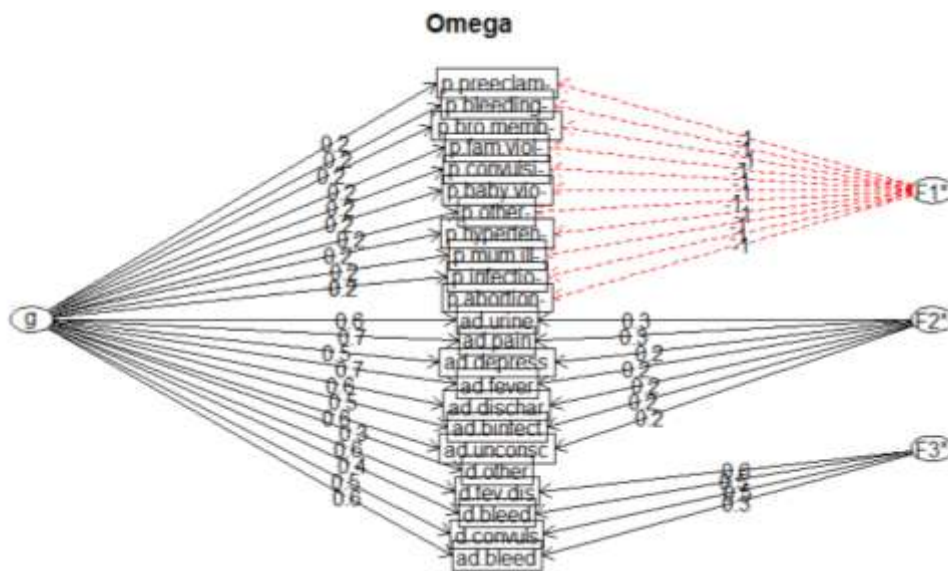


Figure 1b. Ordinal Omega Plot for all Health Status complication variables. Complications during pregnancy (identified with a p. before the complication) have correlations of 0.2 and thus were removed.

Factor Analysis confirmed an additional sub-dimension, albeit weakly correlated, for *complications during pregnancy*. If retained, the final list of variables would represent more closely the concept of Reproductive Health Capability. Importantly, it would measure women's health throughout their pregnancy, in turn reflecting their ability to be in good health and seek it. The removal of these variables, therefore, raises doubts over the DHS' ability to truly capture reproductive health justice. Implications of this are further discussed in the Limitations section. Poor internal consistency between variables ($\alpha = 0.61$) suggests limitations in the coherence of this dimension.

Table 4. Final selection of variables for health status dimension, including full DHS questions, labels, min, max, mean, and sd. (n = 7225)

DHS Questions (in English)	Label	min	max	mean	sd
At the time of (NAME) was born, you had any of the following complications:					
Prolonged labour, that is, contractions strong and regular lasted more than 12 hours?	d.pro.lab	1	2	1.2	0.40
Excessive bleeding after delivery?	d.bleed	1	2	1.2	0.40
High fever with bad smelling vaginal bleeding?	d.fev.dis	1	2	1.0	0.19
Seizures not caused by fever?	d.convuls	1	2	1.0	0.11
As a result of childbirth, during the 40 days after delivery, did you have any of the following problems:					
Heavy bleeding from the vagina?	ad.bleed	1	2	1.1	0.29
Fainting or loss of consciousness?	ad.unconsc	1	2	1.0	0.17
Fever, high temperature, or chills?	ad.fever	1	2	1.1	0.30
Breast infection?	ad.binfect	1	2	1.1	0.23
Pain and burning when urinating?	ad.pain	1	2	1.1	0.30
Vaginal fluids or fluids?	ad.discharg	1	2	1.1	0.28
Involuntary leakage of urine?	ad.urine	1	2	1.0	0.18
Postpartum depression?	ad.depress	1	2	1.1	0.28

2. Healthcare

Twenty-nine variables were selected for healthcare, and basic descriptive statistics calculated (Appendix 2). A separate factor analysis was run for *antenatal care*, and *delivery and postnatal care*.

i. Antenatal care sub-dimension

For antenatal care, seven out of sixteen variables were removed due to prevalence of missing data, high skew and high kurtosis. The DHS codes '*place of*' and '*person at antenatal care visits*' as individual variables. Variables for '*place of*' visits, *knowledge of pregnancy complications*, and *whether drugs were taken for malaria* all showed low correlations and were subsequently removed.

Figure 2 shows the final factor analysis for antenatal care presenting the 9 finally selected variables with both 2 (Figure 2a) and 3 (Figure 2b) factor possible solutions. Figure 2a the first factor is related to antenatal tests (e.g. *whether respondent was weighed, their blood pressure taken, and urine and blood samples taken*), the second factor is related to indicators of quality of antenatal care (e.g. *number of antenatal visits, timing of visits, whether respondent saw a doctor, took iron tablets, and had required number of tetanus vaccinations*). Figure 2b factor 1 relates to antenatal tests, factor 2

relates to additional information (e.g. *whether respondent saw a doctor, took iron tablets, and had required number of tetanus vaccinations*), factor 3 relates to number of, and timing of visits. Either solution is suitable. Importantly, all finally selected variables are associated with our underlying

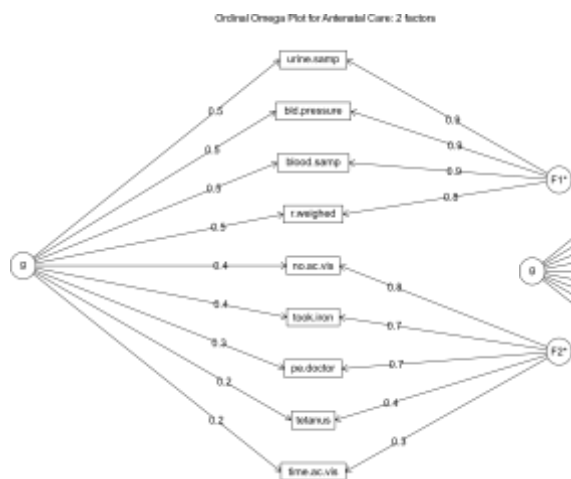


Figure 2a. Ordinal Omega Plot for healthcare dimension: antenatal care with 2-factor solution. Factor 1 can be identified as antenatal visit tests and Factor 2 can be identified as additional information regarding antenatal care.

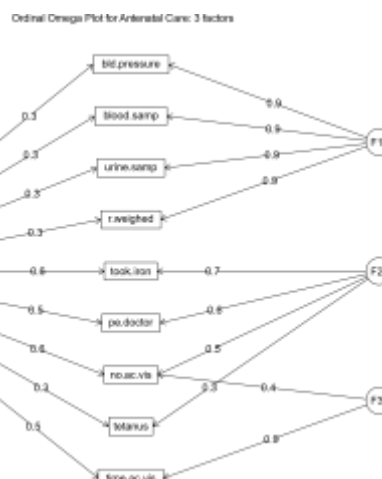


Figure 2b. Ordinal Omega Plot for healthcare dimension: antenatal care with 3-factor solution. Factor 1 can be identified as antenatal visit tests; Factor 2, additional information regarding antenatal care, and Factor 3 identified as the number of timing of visits.

concept in both instances.

Nine final variables were selected for antenatal care (Table 5). Internal consistency between variables was “acceptable” at 0.72 (Nunnally & Bernstein, 1994).

Table 5. Final selection of variables for healthcare dimension, including full DHS questions, labels, min, max, mean and sd. (n = 7225).

DHS Questions (in English)	label	min	max	mean	sd
In some of the prenatal visits, did they do the following:					
Did they take your blood pressure?	blood.pres	1	2	1.95	0.22
Did they take a blood sample?	blood.samp	1	2	1.93	0.26
Weigh you?	r.weighed	1	2	1.95	0.22
Did they ask you for a urine sample?	urine.samp	1	2	1.92	0.27
Additional information					
When you were pregnant with (NAME), did they apply any vaccine to prevent the baby against tetanus, that is, seizures after of birth?	tetanus	1	8	3.27	2.07
When you were pregnant with (NAME), did you have prenatal care (was your	pe.doctor	1	2	1.91	0.29

pregnancy ever checked)? "YES", with whom did you check? Doctor?					
During this pregnancy, were you prescribed iron?	took.iron	1	2	1.93	0.25
Timing and Number of Visits					
How many months pregnant were you when you received your first prenatal checkup?	time.ac.vis	1	3	2.62	0.8
How many prenatal checkups did you have during that pregnancy?	no.ac.vis	1	2	1.35	0.57

ii. *Delivery and Postnatal sub-dimension*

For this sub-dimension, five variables were initially removed due to high skew and kurtosis. Despite a high rho for *delivery assistance: traditional birth assistant*, this variable was retained due to its conceptual importance. A two-factor solution was recommended; factor one organised as delivery care, factor two, postnatal care (Figure 3). All selected variables were associated with the underlying concept (Figure 3).

Ordinal Omega Plot for Delivery and Postnatal care: 2 factors.

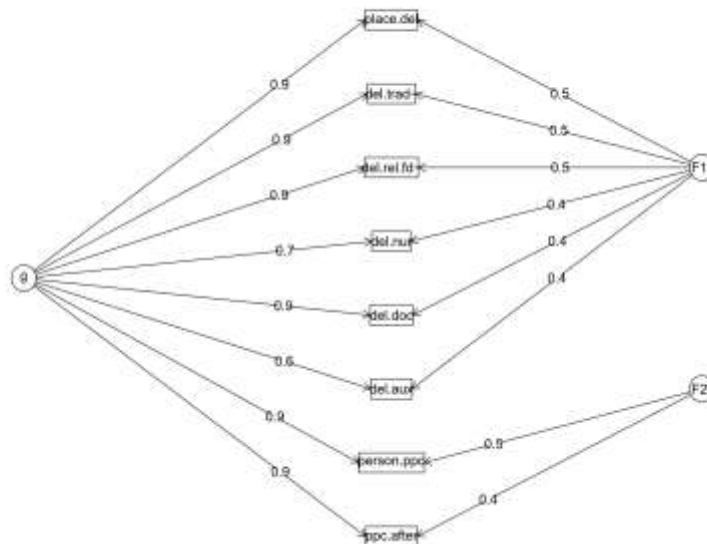


Figure 3. Ordinal Omega Plot for healthcare dimension: delivery and postnatal Care with 2-factors. Factor 1 can be identified as delivery care, and Factor 2 as postnatal care.

The final selection of variables measure access to basic care (Table 6) and information on quality and barriers to access cannot be inferred. Internal consistency between variables was questionable ($\alpha =$

0.61) (Nunnally & Bernstein, 1994). Overall, these selected variables capture a basic level of care for low-risk pregnancies and can be used to address whether minimum and recommended criteria are being met.

Table 6. Final selection of delivery and postpartum care variables, including full DHS questions, labels, min, max, mean, and sd. (n = 7225).

DHS Questions (in English)	<i>Label</i>	<i>min</i>	<i>max</i>	<i>mean</i>	<i>sd</i>
Where did the delivery take place?	place.del	1	2	1.93	0.23
Who attended you at the delivery of (NAME)? Traditional birth assistant	del.trad	1	2	1.02	0.15
Who attended you at the delivery of (NAME)? Relative or friend	del.rel.fd	1	2	1.04	0.20
Who attended you at the delivery of (NAME)? Nurse	del.nur	1	2	1.61	0.49
Who attended you at the delivery of (NAME)? Doctor	del.doc	1	2	1.91	0.28
Who attended you at the delivery of (NAME)? Auxiliary midwife	del.aux	1	2	1.33	0.47
Who checked your health at that time?	person.ppc	1	2	1.99	0.04
Where did this check take place?	ppc.after	1	2	1.22	0.47

3. Health Agency

Twenty variables were initially selected as potentially relevant to health agency (Appendix 3). Four variables were initially removed due to high kurtosis and missing data. The Kaiser-Meyer-Olkin (KMO) values were 0.77, above the threshold suggesting variable robustness and sample suitability for Factor Analysis (Streiner & Streiner, 2016). *VSS*, *nfactors*, and *parallel analysis* recommended four factors. Ordinal omega plot with four factors is shown in Figure 5; all variables bar “*whether child was wanted at time of birth*” (time.child) and “*who has the final say in regards to sexual intercourse?*” (fsay.sex) are shown to be associated with the underlying concept (health agency). These two variables were kept in the final selection on theoretical grounds and are associated with reproductive autonomy. The four factors organise around (1) knowledge of family planning, (2) sexual and reproductive health practices and reproductive health practices (3) men’s sexual and reproductive health norms, and (4) women’s sexual and reproductive health norms. See Table 7. Internal consistency between variables was 0.68.

Ordinal Omega Plot for Health Agency

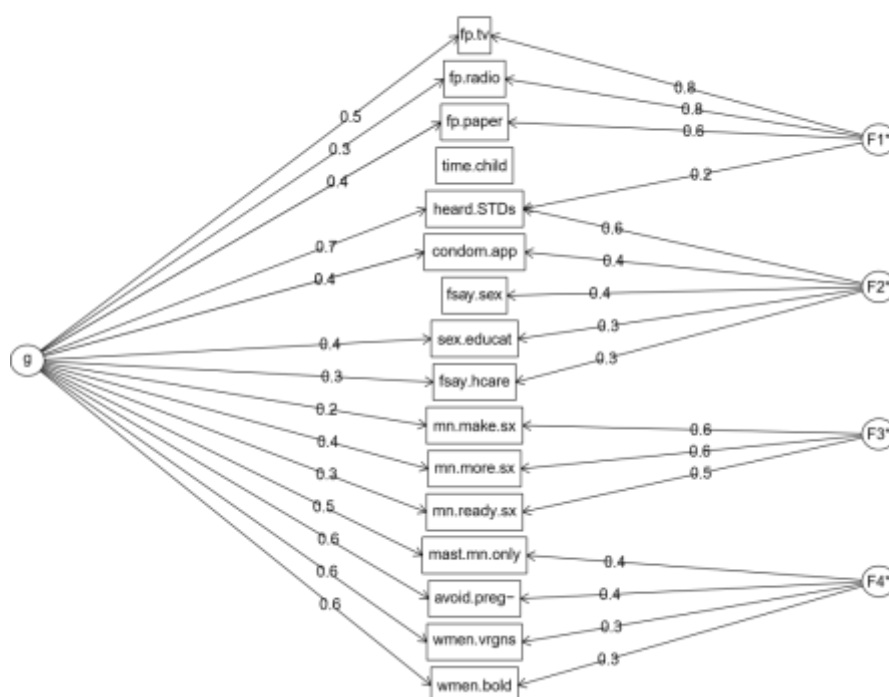


Figure 4. Ordinal Omega Plot for health agency dimension with 4-factor solution. Factor 1 can be identified as exposure to family planning, Factor 2 as sexual and reproductive health practices, Factor 3 as men's sexual and reproductive health norms, and Factor 4 as women's sexual and reproductive health norms.

Table 7. Final selection of health agency variables, including full DHS questions, labels, min, max, mean, and sd. (n = 7225).

DHS Question (in English)	Label	Min	Max	Mean	sd
Knowledge of family planning					
In the last 12 months you: Have you heard about contraception on the television?	fp.tv	1	2	1.72	0.45
Have you heard about contraception on the radio?	fp.radio	1	2	1.49	0.50
Have you read about contraception in newspapers/magazines/internet?	fp.paper	1	2	1.49	0.50
Sexual health practices					
Have you heard of sexually transmitted diseases (STDs)?	heard.STDs	1	2	1.96	0.20
Do you approve or disapprove of couples using a method to avoid getting pregnant?	condom.app	1	3	2.94	0.32
Who in your household has the last word in the following decisions: Taking care of your health?	fsay.hcare	1	4	3.61	0.68
Have you ever received or obtained information on topics or issues in your life related to sex?	sex.educat	1	2	1.93	0.26
Women's sexual norms					
Please tell me if you agree, neither agree nor disagree or disagree with the following statements about relationships between men and women: "A woman must be a virgin at marriage"	wmen.vrgns	1	3	2.44	0.86
"It is women who must take precautions not to get pregnant"	avoid.preg	1	3	2.20	0.95
"It would be daring for a woman to ask to use a condom"	wmen.bold	1	3	2.78	0.59
"Masturbation is a man's thing"	mn.mast.onl	1	3	2.20	0.90
Men's sexual norms					
"Men need more sex than women"	mn.more.sex	1	3	2.12	0.91
"Men are always ready for sex"	mn.ready.sex	1	3	1.71	0.91
"Men don't talk about sex, they do"	mn.make.sex	1	3	1.88	0.93
Reproductive autonomy					

Who in your household has the last word in the following decisions: To have sexual intercourse?	fsay.sex	1	4	3.08	0.51
When you got pregnant, did you want to get pregnant right then, did you want to wait until later, or did you not want any more children?	time.child	1	2	1.51	0.50

4. Empowerment

Forty-three variables were initially selected (Appendix 4) as potentially relevant to empowerment. Thirteen variables were removed due to missing data, and seven were removed due to high kurtosis. An additional thirteen were removed due to $\rho > 0.7$ in the correlation matrix. The overall Kaiser-Meyer-Olkin (KMO) value was 0.9 indicating variable robustness and sample suitability for factor analysis. *VSS*, *nfactors*, and *parallel analysis* recommended 2, 3, and 4 number of factors (Figure 5a,b,c, respectively); they show inconsistent groups of correlated items and hence, no subdimensions were identified.

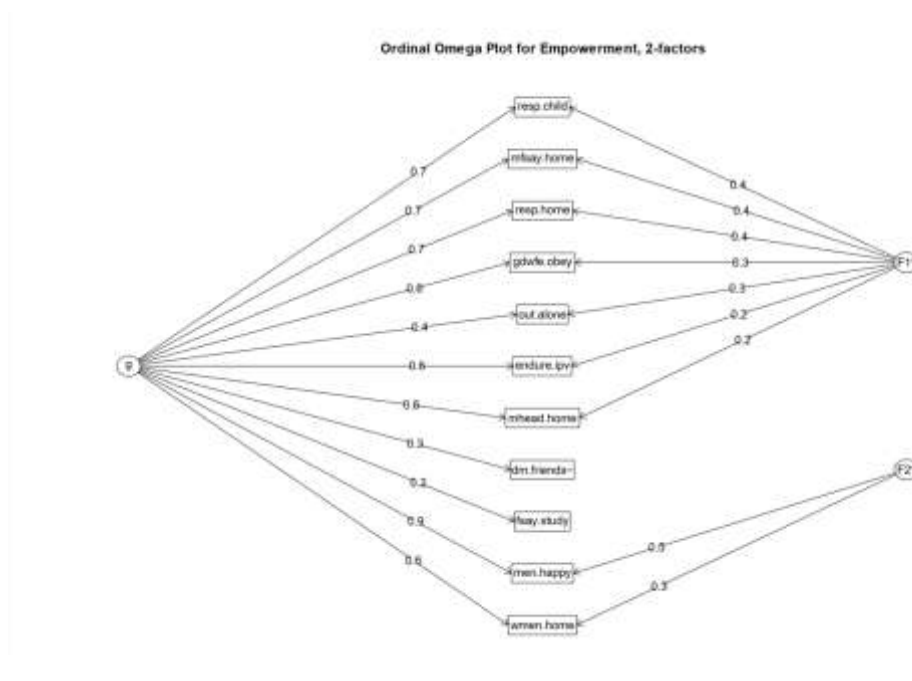


Figure 5a. Ordinal Omega Plot for empowerment dimension with 2-factor solution.

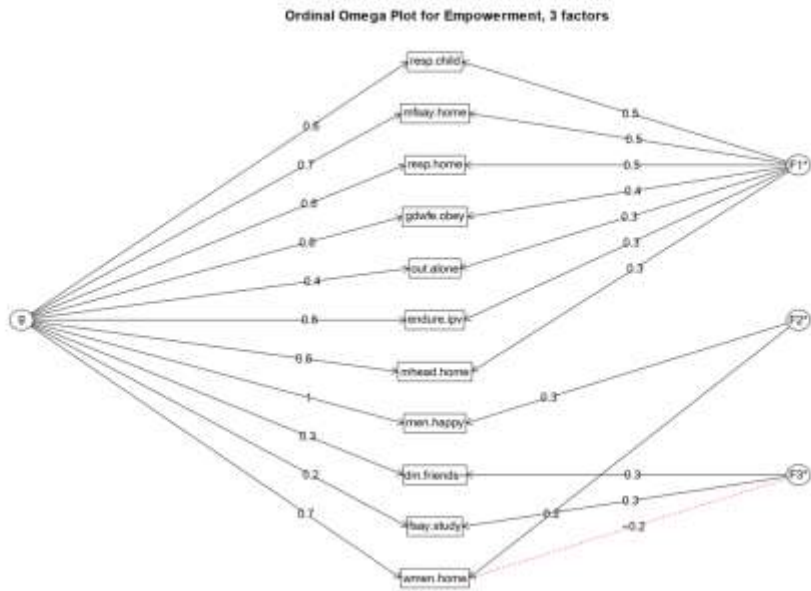


Figure 5b. Ordinal Omega Plot for empowerment dimension with 3-factor solution.

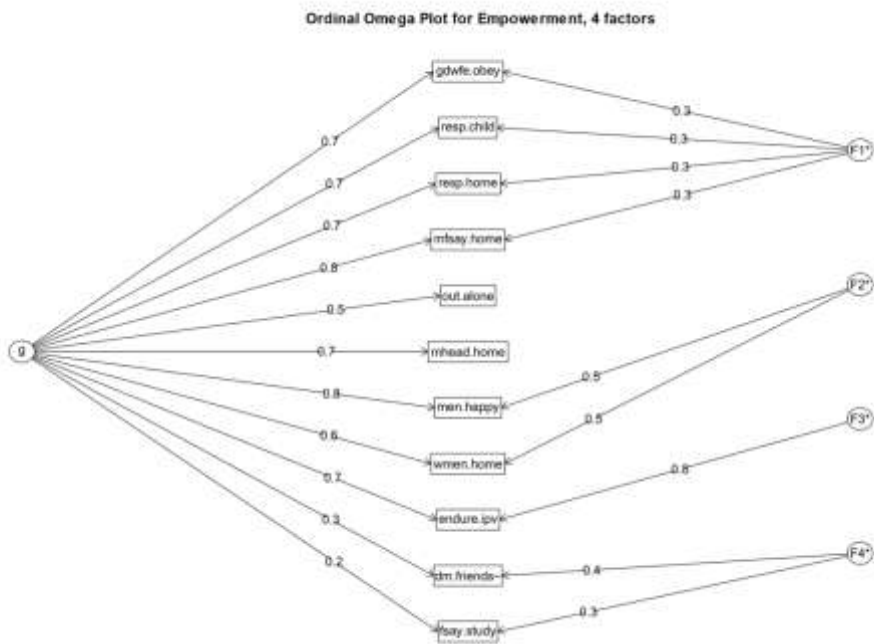


Figure 5c. Ordinal Omega Plot for empowerment dimension with 4-factor solution.

Cronbach's alpha for internal consistency between the final selection of variables (Table 8) was acceptable (0.78), indicating suitable reliability.

Table 8. Final selection of empowerment variables, including full DHS questions, labels, min, max, mean, and sd. (n = 7225).

DHS Questions (in English)	<i>Label</i>	<i>min</i>	<i>max</i>	<i>mean</i>	<i>sd</i>
Please tell me if you agree, neither agree nor disagree or disagree with the following statements about relationships between men and women: "Men are the head of the house."	mhead.home	1	3	1.87	0.95
"A woman needs a man to be happy."	men.happy	1	3	2.45	0.87
"Men need a woman in the house."	mn.wm.home	1	3	1.50	0.83
"When decisions have to be made at home, the men have the last word."	mfsay.home	1	3	2.41	0.87
"Changing diapers, bathing children and feeding them is women's responsibility."	resp.child	1	3	2.27	0.94
"A woman must endure the violence of her husband to maintain her family."	endure.ipv	1	3	2.78	0.59
"A good wife obeys her husband always."	gdwfe.obey	1	3	1.88	0.97
"A woman can choose her friends although her partner doesn't like it."	dm.friends	1	3	2.53	0.79
"It is normal that men do not let their partner go out alone."	out.alone	1	3	2.46	0.85
"The most important role of women is to take care of their home and cook for your family."	resp.home	1	3	2.05	0.97
Who in your household has the last word in the following decisions: To study?	fsay.study	1	4	3.29	0.94

All variables, bar one, investigate women's individual attitudes to stereotypical gender roles. The final variable addresses respondent's decision-making ability over her studying. These variables show moderate consistency with our conceptual definition of empowerment; they indicate promising potential in the DHS to effectively measure reproductive health capability.

5. Bodily Integrity

Thirty-two potentially relevant variables for bodily integrity were identified (Appendix 5). can be found in Appendix 5, along with their descriptive statistics. Of these, nineteen were initially removed due to high kurtoses (>0.7); and eight removed due to rho > 0.7. KMO was 0.89 indicating sample suitability for factor analysis. VSS, *n*factors, and *parallel analysis* recommended 2 and 3 factors (Omega Plots in Figure 6). All variables are shown to be associated with the underlying concept although a two-factor solution shows the least complexity, and thus preferable (Figure 6a). Using a two-factor model, factors can be identified as: experience of abuse from husband/partner, and experience of abuse from other.

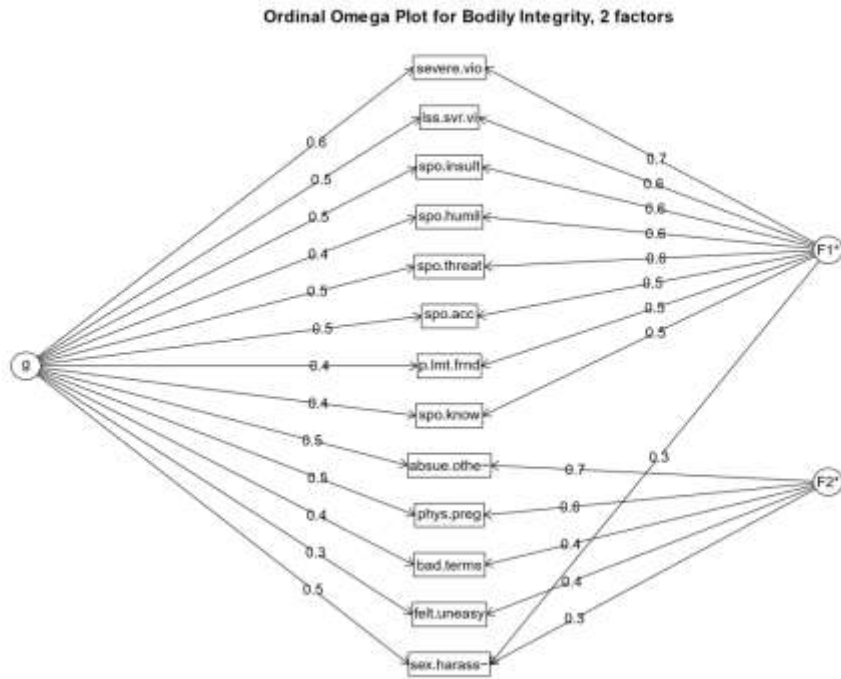


Figure 6a. Ordinal Omega Plot for Bodily Integrity showing 2-factor solution. Factor 1 can be identified as abuse from husband/partner, Factor 2 identified as abuse from others.

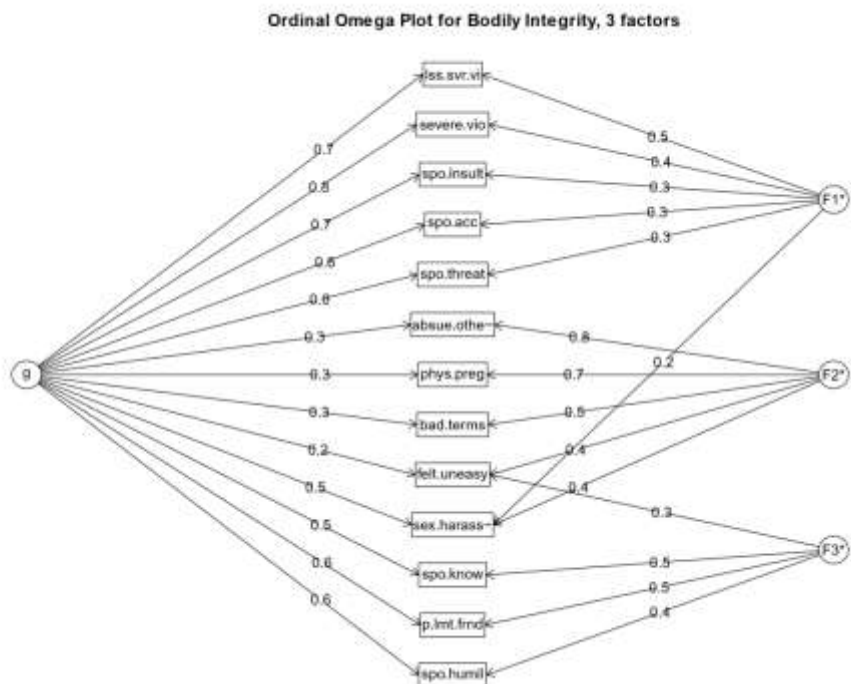


Figure 6b. Ordinal Omega Plot for Bodily Integrity showing 3-factor solution. Factor 1 can be identified as abuse from husband/partner, Factor 2 as abuse from other, and Factor 3 as freedom of movement.

The final selection of bodily integrity variables included indicators of physical, emotional and sexual abuse experienced by husband or partner, violations of bodily integrity experienced by others, and limits on freedom of movement (Table 9). These variables are consistent with our conceptual definition, and internal consistency was good ($\alpha = 0.81$) (Nunnally & Bernstein, 1994).

Table 9. Final selection of bodily integrity variables, including full DHS questions, labels, min, max, mean, and sd. (n = 7225).

DHS Questions (in English)	Label	min	max	mean	sd
I am going to ask you about some situations that happen to some women. Tell me please whether these situations have arisen (occurred) in your relationship with your current or last partner i. Have they attacked you with a knife, firearm, or other weapon? ii. Have they tried to strangle or burn you? iii. Have they kicked or dragged you?	severe.vio	1	2	1.09	0.28
I am going to ask you about some situations that happen to some women. Tell me please whether these situations have arisen (occurred) in your relationship with your current or last partner i. Has he pushed or shaken you? ii. Has he hit you with his hand? iii. Has he hit you with an object?	less.svr.vio	1	2	1.27	0.44
Has your partner addressed you in terms such as: "You are useless", "You never do anything right", "You are a brute"?	spo.insult	1	2	1.21	0.48
Has your partner humiliated you in front of others?	spo.humil	1	2	1.15	0.42
Has he threatened you with a knife, firearm, or other weapon?	spo.threat	1	2	1.16	0.44
Has he accused you of being unfaithful?	spo.acc	1	2	1.14	0.52
Has he prevented you from meeting your friends?	p.lmt.friend	1	2	1.13	0.48
Has he insisted on knowing where you are all the time?	spo.know	1	2	1.27	0.49
Have you been physically abused by anyone other than your partner?	abus.othe	1	2	1.90	0.30
Has anyone hit, slapped, kicked or hurt you when you were pregnant (in any of your pregnancies)?	phys.preg	1	2	1.92	0.27
Has anyone ever addressed you in terms such as: "You are useless", "You never do anything right", "You are a brute"?	bad.terms	1	2	1.10	0.30
Have you ever felt uncomfortable or unsafe in the street?	felt.uneasy	1	2	1.15	0.36
Have you even been touched or fondled without you wanting it?	sex.harass	1	2	1.46	0.50

3.3.2. Internal consistency across the dimensions

A correlation matrix provides insights into the internal consistency, i.e. among dimensions. As the dimensions were not normally distributed a Spearman's correlation was used. There was a strong positive linear relationship between empowerment and health agency (0.66, $p < 0.001$). The relationship between health agency and healthcare (0.41, $p < 0.001$), and empowerment and healthcare (0.35, $p < 0.001$) were relatively strong. Negative linear relationships, although weak, were found between bodily integrity and empowerment (-0.13), and bodily integrity and health agency (-0.06). Weak relationships were also found between health status dimensions and others. These results suggest that both the dimensions health status and bodily integrity are erroneous and should

not be retained in an empirical measure of reproductive health capability despite being of conceptual importance.

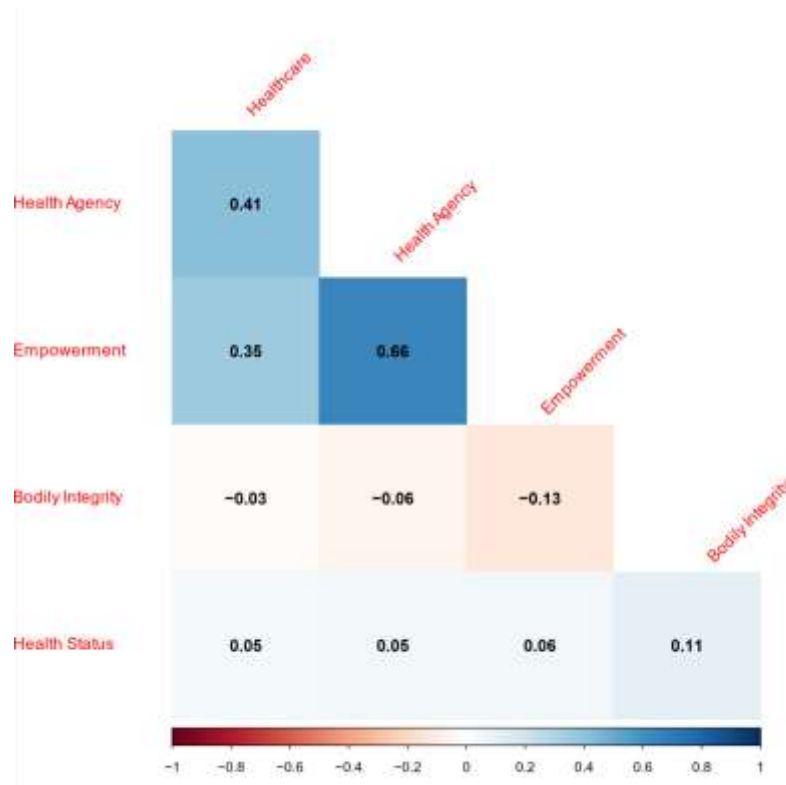


Figure 7. Correlation matrix to test internal consistency between dimensions.

3.3.3. External validity: Known-group analysis

Known-group analysis was completed using boxplots and a general linear model (GLM) and to test the validity of our measures against geographic maternal characteristics well-established to intersect with disadvantage (e.g. deprivation) and health injustice. Our hypotheses were developed according to past research on the associations between our dimensions and covariates. Our measures are deemed valid when they support our hypotheses.

3.3.3.1. Boxplots of Dimension Scores

1. Age

Empowerment (Figure 8a), healthcare (8d), and health agency (8c) show expected patterns against age; positive but diminishing benefits through adulthood i.e. median scores increase with age, with

decreases from 35 years old. Notably, variation in healthcare scores between age groups was small, though it is unclear if this is due to limitations in the variables included in this dimension, or whether these reflect small 'real-world' inequalities in healthcare access (Figure 8d).

Health status (Figure 8e) scores did not show any apparent variation between age groups, which does not support my hypothesis. Bodily integrity (Figure 8b) also shows unexpected variation of scores by age; a sudden apparent, lasting increase in bodily integrity from 35 years old.

2. Level of formal education

Results show expected positive relationships (i.e. apparent benefits) between empowerment, health agency, and healthcare scores by level of education (Figure 9a,c,d, respectively). Formal education appears to be particularly associated with benefits in health agency and empowerment.

For health agency, the highest median score was found in women with higher education, and the lowest in women with no education (Figure 9c).

The effect of education on healthcare is most apparent in Figure 9d. The interquartile range (IQR) is greatest for women with no education and is noted by a significant negative skew (Figure 9d). 75% of healthcare scores for women with no education are the same or below the median score for women with primary education (Figure 9d). Again, highest healthcare values were found in secondary and higher education categories.

Boxplots for bodily integrity (Figure 9b) and health status (Figure 9e) show unexpected variation, or no variation, respectively; these findings do not support our hypothesis. Women with no education have higher bodily integrity scores than women with higher education.

3. Place of residence

For empowerment (Figure 10a), health agency (Figure 10b), and healthcare (Figure 10c), median scores for urban women are higher than for rural women, as expected. The greatest difference

between median scores is seen in empowerment (Figure 10a), and the smallest difference seen in healthcare (Figure 10d).

Boxplots for bodily integrity (Figure 10b) show unexpected variation; there is no difference in median scores between each category. Similarly, there is no variation of scores for health status (Figure 10e). These findings do not support our hypothesis, and thus our known-group test is negative for bodily integrity and health status dimension.

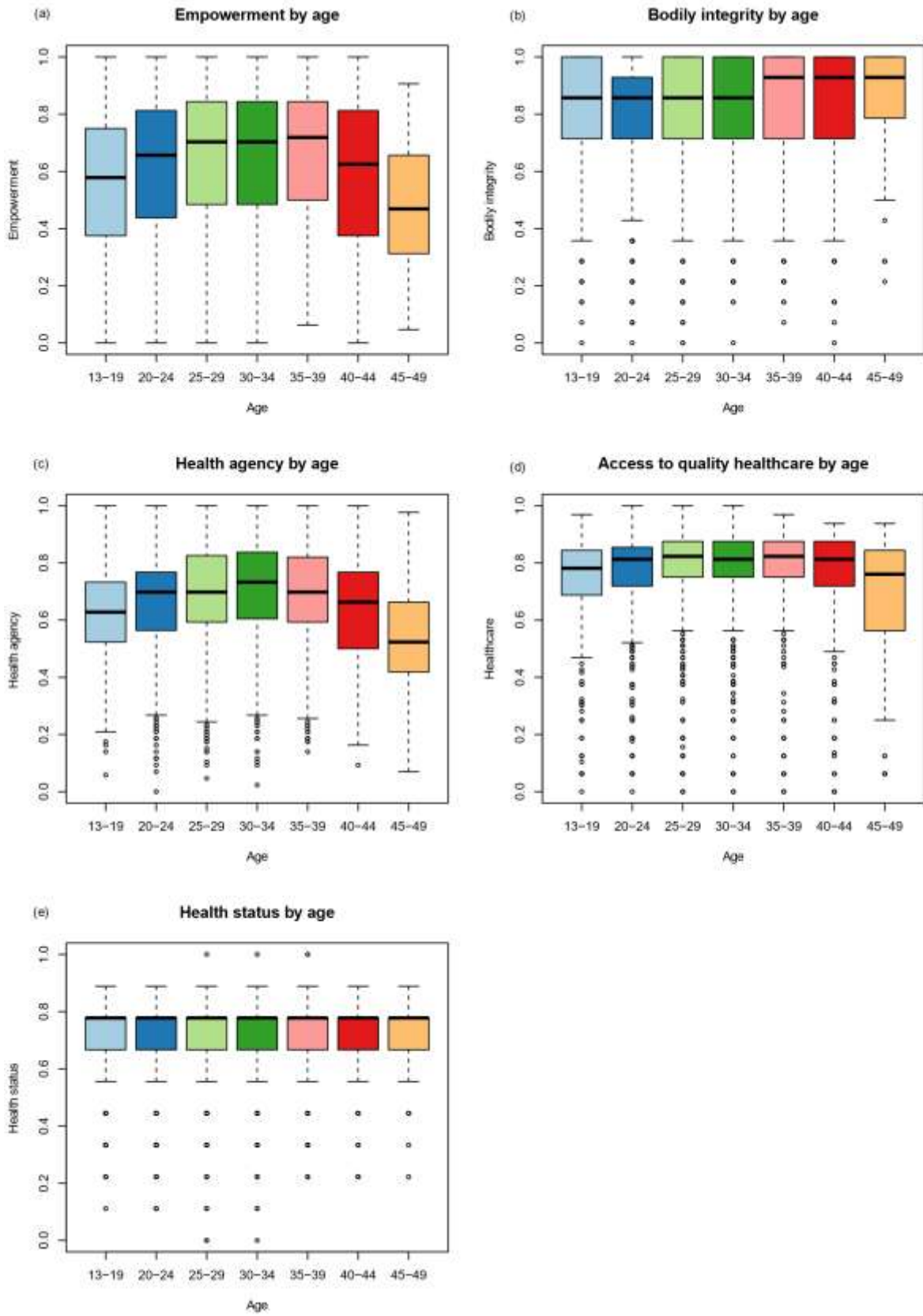


Figure 8. Boxplots of dimension scores by age.

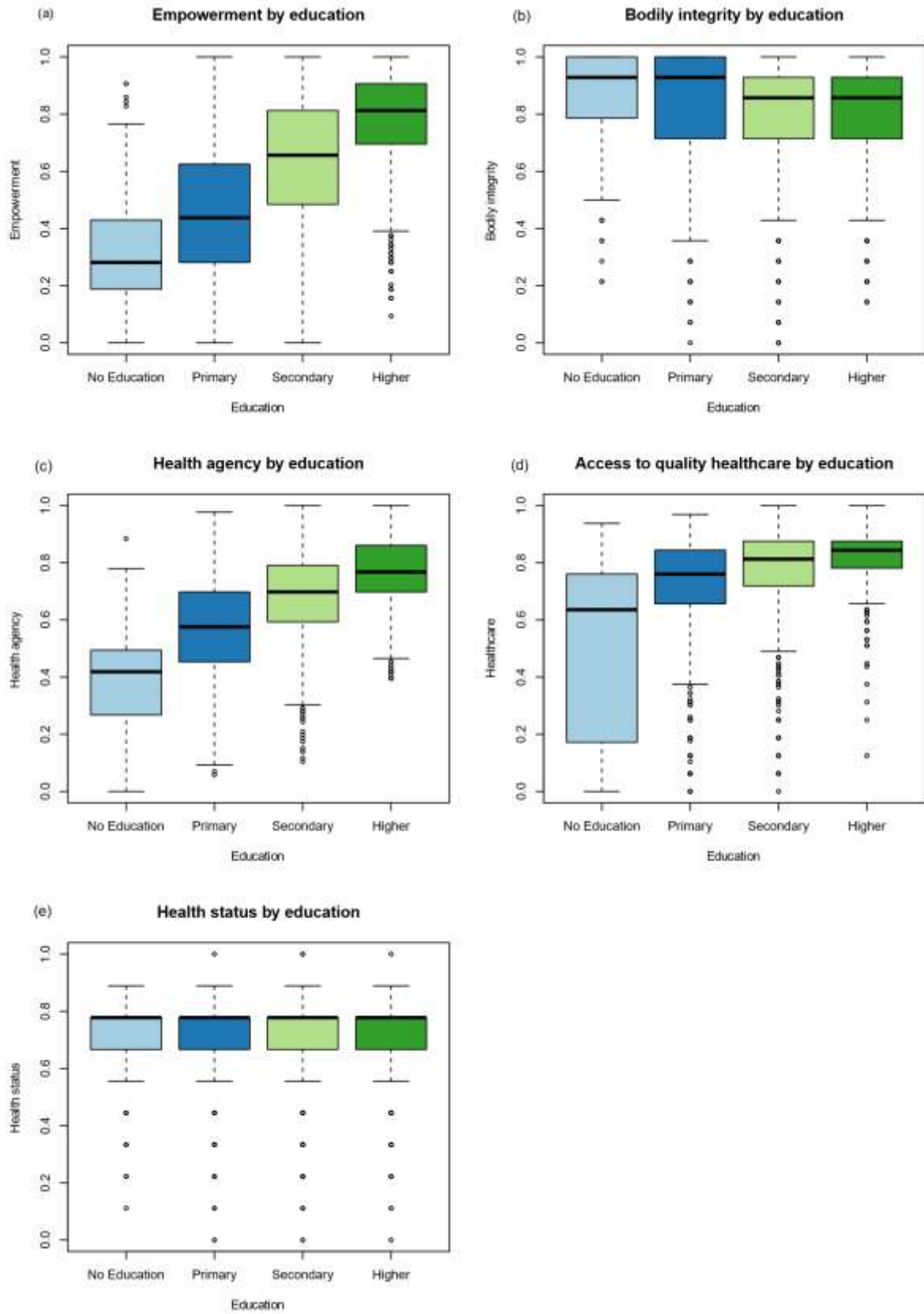


Figure 9. Boxplots for dimension scores by level of formal education.

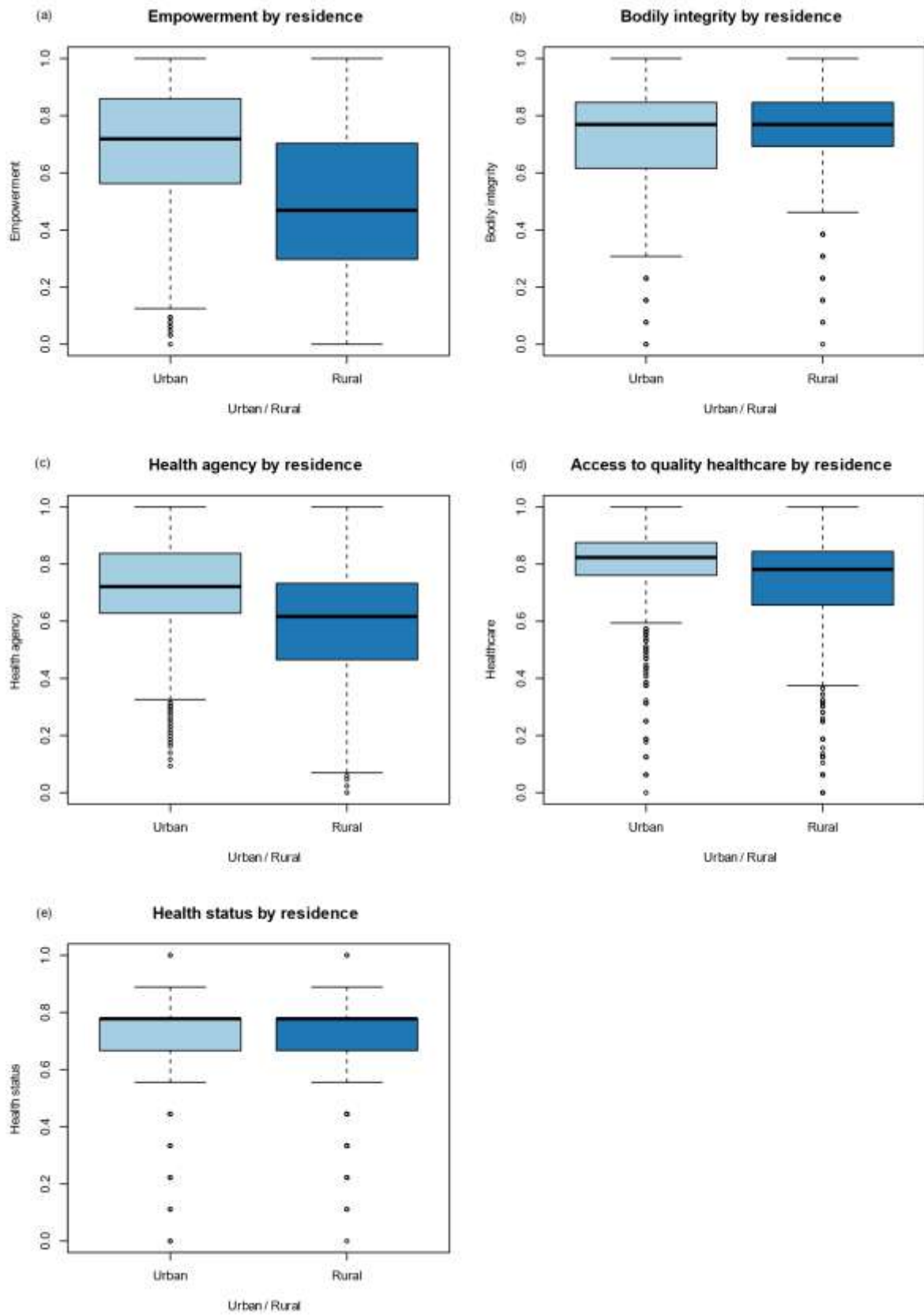


Figure 10. Boxplots for all dimension scores by residence.

4. Ethnicity

Indigenous women have significant lower median scores than White/other and Afro-Colombian women; the median score for Indigenous women is the same as the lower quartile for Afro-Colombian women (Figure 11a). There is wide distribution of empowerment scores for each ethnicity category, however (Figure 11a).

As expected, Indigenous women also report the lowest health agency scores and the lowest median values (Figure 11c). There is no variation in median scores between White/other and Afro-Colombian women, although for Afro-Colombian women there is a negative skew with greater ranges in scores than for White/other women (Figure 11c). The boxplot for health agency scores for White/other women is characterised by a positive skew, smaller boxplot width, and the highest upper quartile of all three groups (Figure 11c).

A similar pattern can also be observed for healthcare (Figure 11d) where median scores for Indigenous women are lower than median scores for White/other and Afro-Colombian women, although only a marginal difference in median scores between White/other and Afro-Colombian is seen. As expected, the highest healthcare scores are found in White/other women (Figure 11d). The greatest distribution of scores is found in Indigenous women (Figure 11d).

Again, no variation in scores for health status is shown (Figure 11e). Figure 11b presents boxplots for bodily integrity scores by ethnicity groups. Unexpectedly, there is no difference in median bodily integrity scores between White/other and Afro-Colombian groups. However, the boxplot for Afro-Colombian category shows a negative skew as somewhat expected. Most surprising is that the Indigenous category has the highest bodily integrity scores. These results do not support our hypothesis and thus raises questions regarding the validity of these dimensions.

5. Region

As expected, women living in more-developed sub-national regions had higher empowerment scores; notably Bogota, East, and Central regions (Figure 12a). Pacific and Orinoco/Amazon regions show similar spread and width of boxplots for empowerment; median scores for these regions were

considerably lower than for Bogota (Figure 12a). The lowest median score was in the Atlantic region (Figure 12a). Health agency scores by region mirror those of empowerment, however variation of median scores is lower (Figure 12c). Again, Atlantic, Pacific, and Orinoco/Amazon regions have the lowest median health agency scores (Figure 12c).

Despite universal healthcare coverage in Colombia, differences in healthcare scores by region are shown in Figure 12d, as was hypothesised. Although marginal median differences, Atlantic, Pacific, and Orinoco/Amazon regions show the greatest interquartile ranges (IQR) and are all characterised by a negative skew (Figure 12d)

No variation is shown in health status scores by region (Figure 12e). An unexpected pattern was observed in bodily integrity scores by region; notably, women in the Atlantic region have the highest median score and smallest spread of scores while the lowest median score is found in Bogota (Figure 12b). These results do not support our hypothesis and once again raises doubts over the validity of these dimensions.

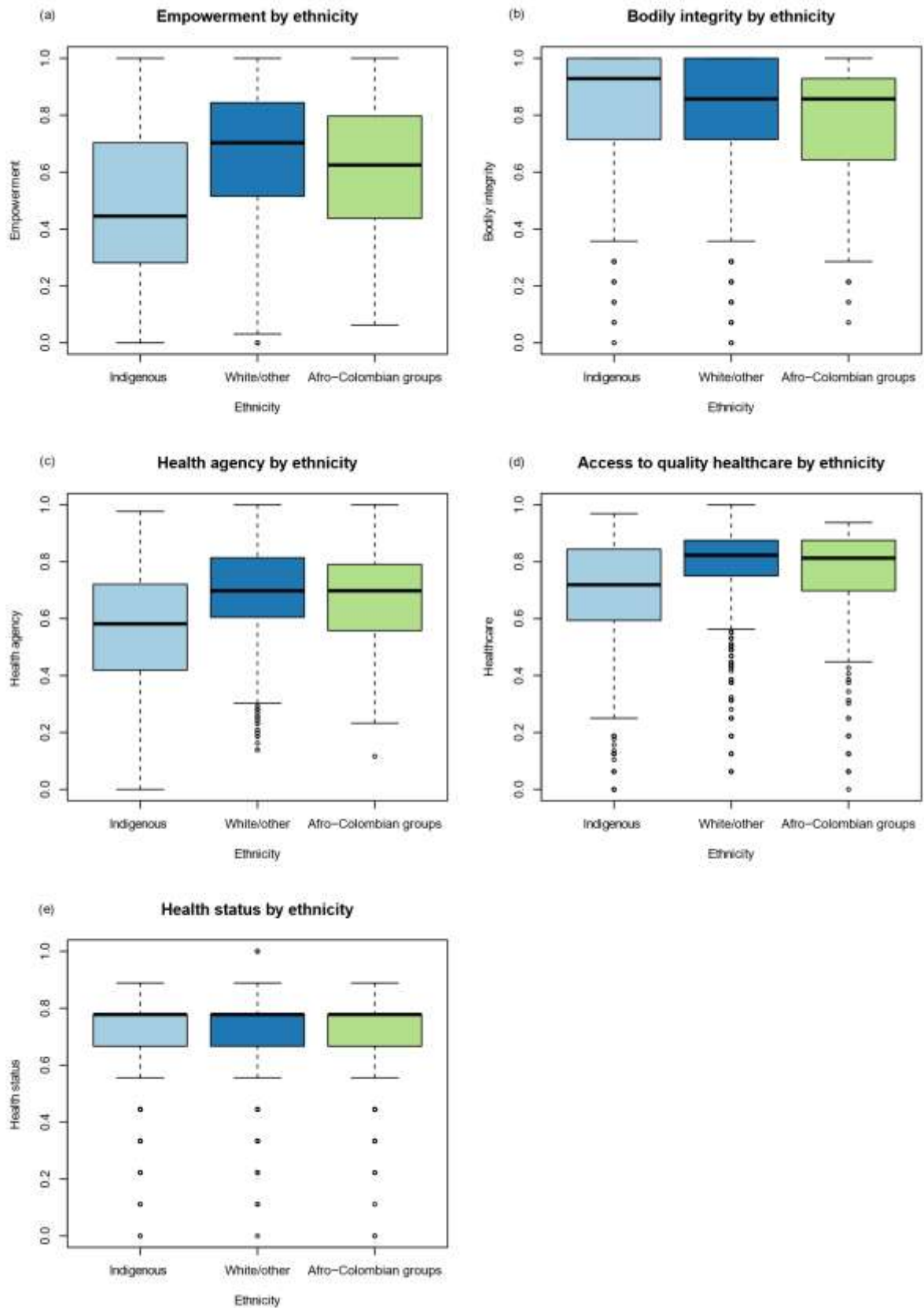


Figure 11. Boxplots for all dimension scores by ethnicity.

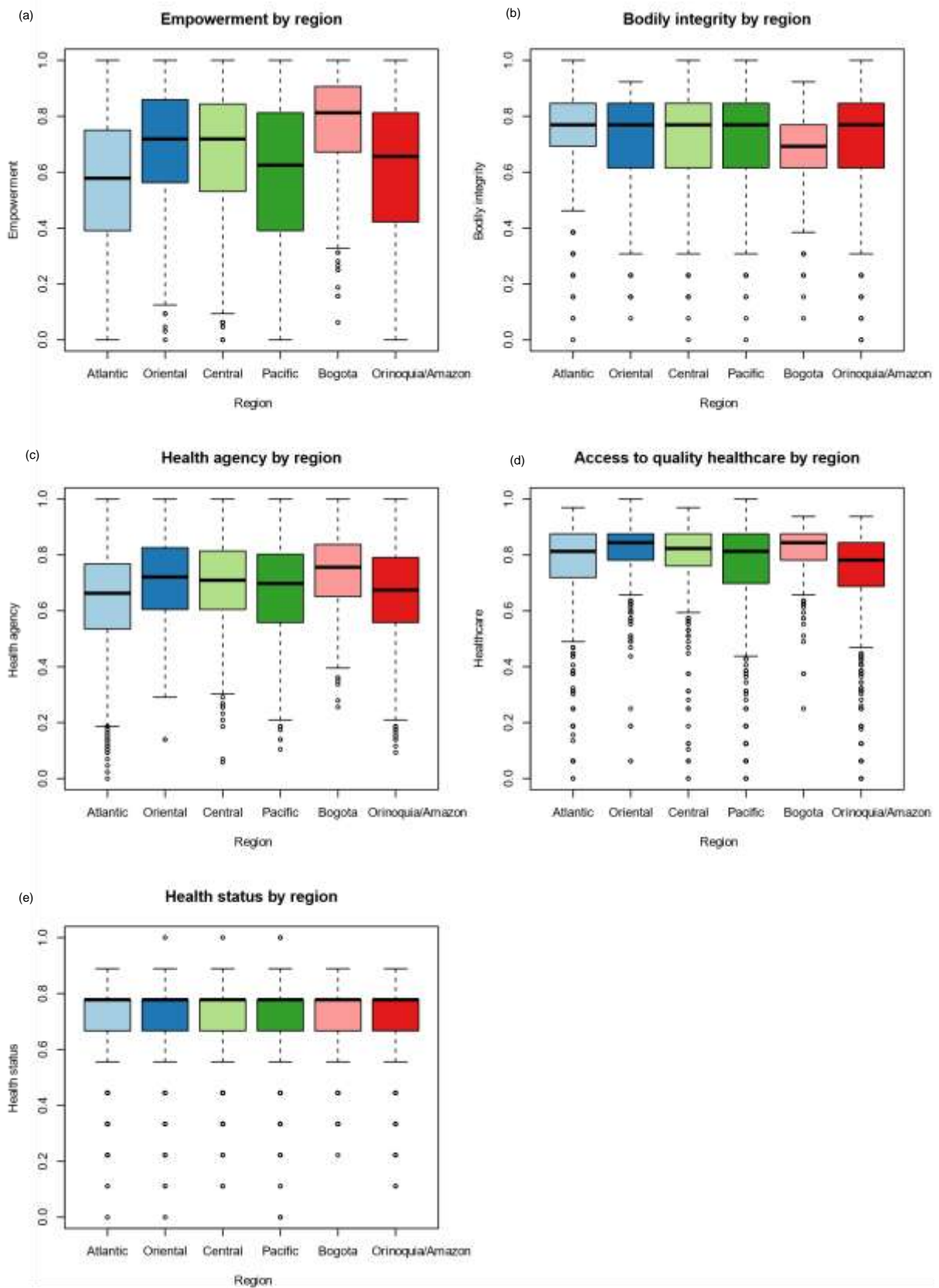


Figure 12. Boxplots for all dimension scores by region.

3.3.3.2. General Linear Model Outputs

1. Health Status dimension model

Table 10 shows the results from the GLM for maternal health status, presenting maternal morbidity estimates associated with selected socio-demographic characteristics. It shows three strongly significant relationships (significantly worse health status in 3 sub-regions of Colombia relative to the “Atlantic” region [Caribbean coast]; East, Central, and Pacific; $p < 0.001$) and one weakly significant difference (worse in Orinoco & Amazon, $p < 0.10$), marginal to the effects of other maternal characteristics.

There is little variation in scores between White/other and Afro-Colombian women when controlling for other characteristics, and both groups have significantly better average health status scores than indigenous women. There is a significant non-linear effect of age on health status scores; women aged 30-44 tend to have much better health than adolescents or women in their early 20s. Only secondary education has a significant effect on health status scores; women with secondary education have better health status scores than women with no formal education. Interestingly, there was no evidence of similar benefits from primary education or higher education. There was no independent significant relationship between rural residence and health status scores.

Table 10. GLM for maternal health status. Maternal health status estimates associated with selected socio-demographic characteristics. * $p < .05$; ** $p < .01$; *** $p < .001$.

Covariates	Estimate	Std. Error	t-value	Pr(>t)
Intercept	0.6655005	0.0103297	64.426	< 2e-16 ***
Region (ref = Atlantic)				
East	-0.0170915	0.0045124	-3.788	0.000153 ***
Central	-0.0138692	0.0039809	-3.484	0.000497 ***
Pacific	-0.0190353	0.0044982	-4.232	2.35e-05 ***
Bogota	-0.0098174	0.0063258	-1.552	0.120717
Orinoco/Amazon	-0.0074009	0.0042335	-1.748	0.080480 .
Residence (ref = urban)				
Rural	0.0039215	0.0032596	1.203	0.228989
Ethnicity (ref = Indigenous)				
White/other	0.0253266	0.004335	5.842	5.37e-09 ***
Afro-Colombian groups	0.0249836	0.0058819	4.248	2.19e-05 ***
Age (ref = 13-19)				

20-24	0.0009229	0.0052324	0.176	0.860003
25-29	0.0126173	0.00527	2.394	0.016684 *
30-34	0.0219657	0.0054579	4.025	5.77e-05 ***
35-39	0.0284561	0.0061386	4.636	3.62e-06 ***
40-44	0.0228455	0.00749	3.05	0.002296 **
45-49	0.0155389	0.0124546	1.248	0.212201
Education ref = no education)				
Primary	0.0137829	0.0088039	1.566	0.117498
Secondary	0.0250117	0.008794	2.844	0.004465 **
Higher	0.0249865	0.0090591	2.758	0.5827

2. Healthcare dimension model

Compared to residents of the Atlantic region, women in the East and Central regions reported having significantly better healthcare (Table 11). Whereas healthcare in Orinoco/Amazon was significantly worse.

Results show a significant positive association between level of education and healthcare received (p values < 0.001). When controlling for other variables, women with higher education have healthcare scores 24.3% higher than those with no education, which is consistent with our hypothesis. Apparent benefits were slightly lower for secondary education and primary education. Education coefficients were much larger than other significant effects, suggesting a strong (though probably complex) relationship between formal education and access to healthcare.

Rural women have significantly poorer healthcare access than their urban counterparts, as was predicted. However, the effect of ethnicity was even larger, with the greatest difference in average healthcare access between white women and indigenous women. Indigenous healthcare also appears worse than available to the average Afro-Colombian mother although the difference was much smaller. Adolescent women had significantly worse healthcare than all other age groups, and the average gap (coefficient) grew throughout adulthood, until around 44 years old.

Table 11. GLM for healthcare. Healthcare estimates associated with selected socio-demographic characteristics.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Covariates	Estimate	Std. Error	t-value	Pr(>t)
Intercept	0.476086	0.012571	37.872	< 2e-16 ***
Region (ref = Atlantic)				
East	0.029579	0.005491	5.386	7.42e-08 ***
Central	0.025400	0.004845	5.243	1.63e-07 ***
Pacific	-0.006475	0.005474	-1.183	0.2369
Bogota	0.002202	0.007698	0.286	0.7749
Orinoco/Amazon	-0.026021	0.005152	-5.051	4.51e-07 ***
Residence (ref = urban)				
Rural	-0.048211	0.003967	-12.154	< 2e-16 ***
Ethnicity (ref = Indigenous)				
White/other	0.075201	0.005276	14.255	< 2e-16 ***
Afro-Colombian groups	0.049208	0.007158	6.874	6.74e-12 ***
Age (ref = 13-19)				
20-24	0.030092	0.006368	4.726	2.34e-06 ***
25-29	0.042320	0.006413	6.599	4.44e-11 ***
30-34	0.050722	0.006642	7.636	2.52e-14 ***
35-39	0.058568	0.00747	7.84	5.16e-15 ***
40-44	0.062336	0.009115	6.839	8.64e-12 ***
45-49	0.028472	0.015157	1.878	0.0604 .
Education ref = no education)				
Primary	0.160263	0.010714	14.958	< 2e-16 ***
Secondary	0.220302	0.010702	20.585	< 2e-16 ***
Higher	0.243977	0.011025	22.13	< 2e-16 ***

3. Health Agency

Women in the East and Central regions reported significantly better health agency scores than women of the Atlantic region, while women of Amazon/Orinoco regions reported significantly worse scores (Table 12).

Again, a significant positive association between level of formal education and health agency (p values < 0.001) was shown. Women with higher education have health agency scores 19.6% higher than those with no education, when controlling for other variables. This finding is consistent with our hypothesis. Education coefficients were larger than other significant effects, indicating an influential relationship between formal education and health agency.

Compared to urban women, rural women have significantly poorer health agency as was predicted. However, ethnicity had a greater effect where the greatest differences in average health agency scores is observed between indigenous and white women. Adolescent women had significantly worse health agency than all other age groups.

Table 12. GLM outputs for health agency. Health agency estimates associated with selected socio-demographic characteristics. * $p < .05$; ** $p < .01$; *** $p < .001$.

Covariates	Estimate	Std. Error	t-value	Pr(>t)
Intercept	0.289963	0.007738	37.474	< 2e-16 ***
Region (ref = Atlantic)				
East	0.030252	0.00338	8.95	< 2e-16 ***
Central	0.032638	0.002982	10.945	< 2e-16 ***
Pacific	0.029746	0.003369	8.828	< 2e-16 ***
Bogota	0.028610	0.004739	6.038	1.64e-09 ***
Orinoco/Amazon	0.016409	0.003171	5.174	2.35e-07 ***
Residence (ref = urban)				
Rural	-0.02761	0.002442	-11.307	< 2e-16 ***
Ethnicity (ref = Indigenous)				
White/other	0.042178	0.003247	12.989	< 2e-16 ***
Afro-Colombian groups	0.032600	0.004406	7.399	1.53e-13 ***
Age (ref = 13-19)				
20-24	0.016338	0.003919	4.168	3.10e-05 ***
25-29	0.030248	0.003948	7.662	2.07e-14 ***
30-34	0.039416	0.004088	9.641	< 2e-16 ***
35-39	0.036977	0.004598	8.041	1.03e-15 ***
40-44	0.025481	0.005611	4.542	5.67e-06 ***
45-49	0.009064	0.009329	0.972	0.331
Education ref = no education)				
Primary	0.092577	0.006595	14.038	< 2e-16 ***
Secondary	0.158736	0.006587	24.097	< 2e-16 ***
Higher	0.196572	0.006786	28.967	< 2e-16 ***

3. Empowerment

Model results demonstrate that maternal empowerment is significantly associated with sub-national region, rural residence, ethnicity, age, and formal education (Table13). Similar statistical relationships to health agency are observed here with empowerment; apart from women aged 40-49, all socio-demographic characteristics have a positive effect on empowerment scores.

Women living in Central, East, and Bogota regions have, on average, 1% higher empowerment scores than women living in the Atlantic (Caribbean) region. Orinoco/Amazon and Pacific regions show intermediate levels of empowerment, on average. Even controlling for formal education, rural women have a 0.8% lower empowerment score than urban women, confirming our hypothesis

White women have 0.7% higher empowerment scores than Indigenous women, while Afro-Colombian women have 0.5% higher empowerment scores than Indigenous women, as expected. Formal education, as expected, had a very strong influence on maternal empowerment. Women with higher education have 35% higher empowerment scores than women with no education, with still sizeable benefits from secondary education (23% higher) and some benefits from primary education (8% higher).

Table 13. GLM outputs for empowerment. Empowerment estimates associated with selected socio-demographic characteristics. * $p < .05$; ** $p < .01$; *** $p < .001$.

Covariates	Estimate	Std. Error	t-value	Pr(>t)
Intercept	0.266152	0.017286	15.397	< 2e-16 ***
Region (ref = Atlantic)				
East	0.106379	0.007551	14.088	< 2e-16 ***
Central	0.091252	0.006662	13.698	< 2e-16 ***
Pacific	0.075660	0.007527	10.052	< 2e-16 ***
Bogota	0.125480	0.010586	11.854	< 2e-16 ***
Orinoco/Amazon	0.062719	0.007084	8.853	< 2e-16 ***
Residence (ref = urban)				
Rural	-0.086863	0.005455	-15.925	< 2e-16 ***
Ethnicity (ref = Indigenous)				
White/other	0.078325	0.007254	10.797	< 2e-16 ***
Afro-Colombian groups	0.050885	0.009843	5.17	2.41e-07 ***
Age (ref = 13-19)				
20-24	0.024847	0.008756	2.838	0.00456 **
25-29	0.053622	0.008819	6.08	1.26e-09 ***
30-34	0.057846	0.009133	6.334	2.54e-10 ***
35-39	0.073460	0.010272	7.151	9.45e-13 ***
40-44	0.053378	0.012534	4.259	2.08e-05 ***
45-49	0.035355	0.020841	1.696	0.08986 .
Education ref = no education)				
Primary	0.080585	0.014732	5.47	4.65e-08 ***
Secondary	0.232659	0.014716	15.81	< 2e-16 ***
Higher	0.350334	0.015159	23.11	< 2e-16 ***

4. Bodily Integrity

Self-reported bodily integrity was strongly associated with geographic region, rural/urban residence and partially associated with ethnicity and education (Table 14). There was no independent effect of women's age.

Unexpectedly, rural women have 3.9% higher bodily integrity scores than urban women i.e. urban women experience more abuse. Equally unexpected, Afro-Colombian women have 4.2% lower bodily integrity scores than Indigenous women. Despite region having a significant effect ($p < 0.001$); on bodily integrity scores, variance between regions is marginal. Moreover, regions characterised as more developed and progressive such as Bogota have 6.2% lower bodily integrity scores than Atlantic women, which does not support our hypothesis.

Table 14. GLM outputs for bodily integrity. Bodily integrity estimates associated with selected socio-demographic characteristics. * $p < .05$; ** $p < .01$; *** $p < .001$.

Covariates	Estimate	Std. Error	t-value	Pr(>t)
Intercept	0.86965	0.01789	48.612	< 2e-16 ***
Region (ref = Atlantic)				
East	-0.055849	0.007815	-7.147	9.77e-13 ***
Central	-0.044864	0.006894	-6.507	8.16e-11 ***
Pacific	-0.059214	0.00779	-7.601	3.31e-14 ***
Bogota	-0.062234	0.010955	-5.681	1.39e-08 ***
Orinoco/Amazon	-0.058594	0.007332	-7.992	1.54e-15 ***
Residence (ref = urban)				
Rural	0.039798	0.005645	7.05	1.96e-12 ***
Ethnicity (ref = Indigenous)				
White/other	-0.007844	0.007508	-1.045	0.2962
Afro-Colombian groups	-0.042392	0.010187	-4.161	3.20e-05 ***
Age (ref = 13-19)				
20-24	-0.013717	0.009062	-1.514	0.1302
25-29	-0.006218	0.009127	-0.681	0.4957
30-34	0.005721	0.009452	0.605	0.5450
35-39	0.012199	0.010631	1.147	0.2512
40-44	0.015229	0.012972	1.174	0.2404
45-49	0.028692	0.02157	1.33	0.1835
Education ref = no education)				
Primary	-0.01346	0.015247	-0.883	0.3774
Secondary	-0.028679	0.01523	-1.883	0.0597 .

3.3.4. Summary statistics of final empirical model

Table 15. Summary statistics for final empirical model. All dimensions, Reproductive Health Capability (RHC) for 5 dimensions and for 3 also given.

Dimensions	n	mean	sd	median	min	max	IQR
Empowerment	7225	0.63	0.24	0.67	0	1	0.34375
Health Agency	7225	0.68	0.17	0.7	0	1	0.23255
Healthcare	7225	0.77	0.16	0.81	0	1	0.15625
Health Status	7225	0.71	0.11	0.78	0	1	0.11111
Bodily Integrity	7225	0.71	0.15	0.77	0	1	0.23076
RHC (5 dimensions)	7225	3.51	0.50	3.59	0.94	4.54	0.60434
RHC (3 dimensions)	7225	2.08	0.46	2.17	0.19	2.91	0.64395

Overall, the final empirical instrument is somewhat consistent with the conceptual framework in that access to basic care before, during, and after delivery is covered. Critically, questions to assess dignity and autonomy, discrimination and patient experience, and whether interventions were successful would all be useful additions in a capability-based measure of healthcare.

3.3.5. Consistency between conceptual framework and empirical instrument

Given the validity results for Health Status and Bodily Integrity dimensions, the final empirical model is inconsistent with the original conceptual framework. Complications during pregnancy variables were removed and thus the Health Status dimension is composed only of complications during and after delivery. In the conceptual framework, maternal morbidity was defined as “*any health condition attributed to and/or complicating pregnancy and childbirth that has a negative impact on women’s wellbeing and/or functioning*” (WHO, Chou et al., 2016: 6). Aside from women’s health status during pregnancy, the final selection of variables measure specific health conditions women are most vulnerable to during and after delivery. Any other indicators of a mother’s mental wellbeing, her nutritional status, and the duration of complications are missing. The addition of these variables would provide a more informative perspective of a woman’s health status. While the final selections of Bodily Integrity variables were promising, the dimension performed poorly in validity tests. To remind the reader, Bodily Integrity was defined by the conceptual model as the treatment of women’s bodily boundaries as sovereign, within the home, outside the home, and within a healthcare facility. The variables do in fact identify experiences of violence from respondent’s partner, and instances where her freedom of movement is curtailed. Conceptually, this is a vital capability to reproductive health.

Empirically, further development and analysis of a suitable index to measure bodily integrity is needed.

Of the remaining dimensions, however, there is coherence with the conceptual framework. In regard to Health Agency, my conceptual framework stressed the importance of health knowledge, health norms, and reproductive freedom. The final variable selection in the empirical instrument reflects all three sub-dimensions, and finds a four-dimension sub-structure, separating health norms to reflect those associated with men, and those with women. Variables asking respondents about their exposure to family planning, sex education, and knowledge of STIs measure some level of cognitive accessibility to health knowledge. In the global health discourse, exposure to family planning is a widely accepted good but in line with Reproductive Justice, our concern should not just be access to reproductive health knowledge, but also to what that knowledge entails. The final selection of variables provide no such information; which methods are promoted, where these messages come from, and to whom these messages are directed to would provide additional strength to this dimension. Although, given the inherent limitations of the DHS (as will be further discussed in section 4.2. *Limitations*) the final empirical dimension for health agency is overall promising in capturing the core capabilities that enable women with potential to transform health resources into health functionings.

For Empowerment, no substructure was pre-identified in the conceptual framework, however, the definition of empowerment proposed by Drydyk (2013) stressed empowerment as a concept of relational power that enables women to shape their life for the better, and a transformative process in which asymmetries of power are reduced. Interestingly, all variables related to household chores, household decision making, and economic independence were removed, and the final selection is composed of (except for one: *“who has the final say: respondent’s studying”*) attitudes and opinions on gender roles. These variables are taken from the Gender Equality Men’s (GEM) Scale and capture information about belief, norms and attitudes, rather than individual experiences. Measuring attitudes indicates a social cognitive process, the ability to formulate opinions, gather social information, organise it, and interpret it (Zimmerman, 2000). Naturally, the most significant limitation is that these variables do not tell us about the actual behaviours and practices of individuals, and understanding attitude-behaviour relationships is difficult (Mackie, 2014). However, asking respondents opinion on

particular gendered scenarios assesses an internal power which can indicate perceptions of control and efficacy. These are central to the concept of empowerment because they motivate individuals to initiate change (Zimmerman, 2000). Through such gendered scenarios, these variables also measure relational power between respondents and their partners, and thus identify power (a)symmetries. Importantly, these variables also capture the procedural element of Drydyk's conception of empowerment; defying social norms is a critical element of the empowerment process (Evans, 2018). Overall, there is strong consistency between the conceptual framework and the empirical instrument.

Finally, in regard to Healthcare, the conceptual framework stressed that healthcare must be assessed on its ability to enhance capability, wellbeing, and of course health, as well as access to care. The most significant limitation of the Healthcare dimension is its inability to measure quality. Critically, from a Reproductive Justice and Health Capability perspective, questions to assess dignity and autonomy, and overall patient experience including discrimination are vital to uncover instances of injustice within the health system. Naturally, assessing whether healthcare enhanced capability is particularly challenging given this is not a longitudinal study. More nuanced handling of variables to develop this empirical index would improve its measurement ability. Overall, the final empirical instrument is somewhat consistent with the conceptual framework in that access to basic care before, during, and after delivery can be assessed.

3.3.6. Summary

I have conducted exploratory analysis to address whether the DHS can be effectively re-proposed to assess reproductive health capability. To develop my measure of reproductive health capability, I have employed a number of techniques to select relevant variables, and assess the internal consistency within and between dimensions, and completed known-group analysis to test the external validity of our measure.

To summarise, all five empirical dimensions showed relative consistency with our conceptual definitions. The final variable selection for empowerment and health agency was particularly consistent and promising in regard to re-purposing the DHS as a tool to measure justice. Selected variables for bodily integrity were also promising in capturing abuse from partner, as well as others,

and indicators of freedom of movement. However, selected variables for healthcare and health status were only moderately consistent with our conceptual definitions. Available healthcare variables in the DHS used in Colombia (2015) failed to assess quality and service experience, while health status variables were limited to only rare events.

Internal consistency across dimensions showed weak relationships between health status and all other dimensions, and bodily integrity with all other dimensions. These results suggest possible removal of dimensions from an index of reproductive health capability, at least if using the DHS. The removal of these dimensions is further supported by the negative results from the known-group analysis tests. Health status scores showed no variation by selected socio-demographic variables and bodily integrity scores showed unexpected and unrealistic variations. All other dimensions (empowerment, health agency, and healthcare) confirmed our hypothesis and can be considered valid dimensions. Assessing reproductive health capability for women in Colombia using the 2015 DHS survey revealed that urban women, women aged between 30-39, living in Bogota and Central regions, White/other, and with secondary and higher education have greater reproductive health capability.

3.4. Discussion

The results show promise in re-purposing the DHS to measure justice in health and confirm persisting reproductive health inequity in Colombia. Specifically, rural and indigenous women perform lower in all dimensions indicating that they lack reproductive health capability. Results also indicate regional variations of capability with Pacific and Amazon/Orinoco regions performing worse. Notably, results found a reliable and valid empirical measure for reproductive health agency which, to date, has not been previously developed. Using a standardised and international survey is encouraging to measure and monitor reproductive health inequities. Finally, possible complex interactions between education and our dimensions indicate the critical importance of formal education on women's capability. Our main findings provide evidence for the potential use of Reproductive Health Capability to measure inequities in reproductive health and guide future policy on tackling injustice in reproductive health.

A promising empirical measure of health agency

Our results show a novel empirical measure for health agency composed of five sub-dimensions: *exposure to family planning, sexual and reproductive health practices, reproductive autonomy, men's sexual and reproductive health norms, and women's sexual and reproductive health norms*. Critically, the final selection of variables covers the components of a capability-led definition of health agency: *the personal autonomy to achieve valued health goals and to act as an agent of one's own health* (Ruger, 2007; Drydyk, 2013). In fact, our empirical measure of health agency distinguished between men's and women's health norms, capturing at least in part, a relational dynamic through which women negotiate reproductive health behaviours and responsibilities (Connell, 2012). Moreover, our health agency index performed well under known-group analysis finding degrees of injustice experienced by disadvantaged populations; notably, those with less education, indigenous, and living in rural and Pacific and Amazon/Orinoco regions. Our results indicate that policies targeting health agency should be just as critical as health interventions (Feldman et al., 2015).

To the best of our knowledge, no previous study has developed an empirical measure of health agency to reproductive health, despite previous applications of the capability approach to reproductive health. This is somewhat surprising given the centrality of (health) agency to capability. An empirical measure for general health agency is provided in Tellez Carera's (2021) study assessing health capability in a Purepecha indigenous community in Mexico; comprised of four *researcher-designed* indicators: (i) preventative measures to secure health (ii) achievement of health goals (iii) traditional medicine knowledge (including its effects), and (iv) ability to obtain health information. This is an encouraging list of indicators relevant to its study context and shows similarity with our own variable selection. Additional qualitative work also shows similarity with our empirical index; Feldman et al.'s (2015) study provides a measure of health agency based on four foci: autonomy, participation, self-efficacy, and health systems.

However, using the DHS, our index provides an accessible measure to conduct spatial and temporal comparisons. Moreover, it provides greater understanding of the ever-important context in which women exercise autonomy and health. It identifies whether a woman is able to achieve specific reproductive health goals by assessing the requirements a woman needs to convert resources and opportunities into valued functionings. Without which we risk an impoverished view of women's health

agency. Consequently, our index distinguishes itself from assessments of opportunity, and assessment of outcome models. Our selected variables for health agency indicate promising use of the DHS in health justice.

Regional variation of reproductive health capability

Our results have found significant regional variations in all dimensions; specifically, women living in the Pacific and Amazon/Orinoco regions lack reproductive health capability. Women living in these regions had lower scores in health agency and empowerment. Regional variation of health agency and empowerment scores indicates societal and cultural heterogeneity of Colombian society and the importance to consider such differences in reproductive health policy. Specifically, the Caribbean region (which is included in the Pacific regional category) is characterised by a culture of machismo, characterised by limited sexual health communication and paternal responsibility, and lower empowerment for women regarding negotiation of sexual relationships (Marrugo et al., 2004; Drewy & Garces-Palacio, 2020). Previous studies have highlighted the Pacific region with women reporting the highest proportion of women who have experienced physical or sexual abuse (Pallitto & O'Campo, 2004), and lower empowerment among women (Drewy & Garces-Palacio, 2020).

This is important because empowerment and health agency help women recognise the need for pregnancy care and to navigate the health system more effectively. Although I did not test the effect of health agency and empowerment on healthcare scores, Osorio et al. (2014) find women's empowerment as a contributing factor for antenatal care visits for women in Colombia. My results found women in the Pacific and Amazon/Orinoco region had lower healthcare scores than women living in Bogota and the Central regions. Interestingly, our healthcare GLM shows no significant influence of Bogota and Pacific regions on healthcare scores, they do for health agency however. Bogota and the Pacific region represent one of the wealthiest and poorest regions respectively, suggesting that a socio-cultural influence on access and utilisation of healthcare is greater than a structural one (i.e., lack of health service provision). Although ascertaining the causes of differences in scores is complex, access and utilisation of pregnancy care is essentially influenced by a "*spectrum of decision-making*" (Haddrill et al., 2014: 11) shaped by both structural and non-material constraints (Haddrill et al., 2014).

Regional disparities in all dimension scores indicate social stratification where disadvantaged women are less likely to have the capability to reproductive health recognising a social gradient to capability. Critically, reproductive health interventions must address the regional socio-cultural influence on women's empowerment and health agency.

Urban advantage and rural neglect in Colombia

In all dimensions, rural women scored lower than urban women. Our results also show indigenous women performing worse in all dimensions. Although our analysis is not explicitly intersectional, 78.6% of the indigenous community resides in rural areas (IWGIA, 2019), Deprivation in scores can be attributed directly and indirectly to the failure of government obligations. Hawthorne & Kwan find rural areas characterised by limited healthcare access and poor-quality healthcare (2012), a consequence of a weak or absent government (Robinson, 2007). In regard to social capabilities, rural populations often struggle with lack of opportunities, unemployment or risky employment, and experience a policy bias to the wealthy and urban populations (Weeks, 2018). Lack of justice in rural society has majorly impacted low-income rural families by making them susceptible to systematic misappropriation, displacement, food insecurity, and making their land a vulnerable asset (Berry, 2017). On the other hand, urban populations have seen greater improvements in health indicators (Harpam et al., 2003; Garcia, 2020), attributed to better public health coverage and greater utilisation of services due to proximity (Garcia, 2020). Thus, our results indicate a level of systematic rural neglect and evidence of an "urban advantage" in Colombia (Garcia, 2020).

However, it is important to note that the majority of Afro-Colombian populations reside in urban areas, and while dimension scores were better than indigenous women, Afro-Colombian scores were consistently lower than white women, suggesting that this "urban advantage" in health may not be representative of the whole urban centre (Matthews et al., 2010). Urban areas are spatially and socially heterogeneous, and variability in healthcare accessibility is to be expected (Matthews et al., 2010). Colombia is a country of 7 million internal migrants, where rural-urban migration has been the predominant pattern (Calderon et al., 2011). Internal displacement to urban areas has led to the emergence of informal settlements which often lack basic sewage, water, and electricity leading to worse health for many women (Albuja & Ceballos, 2010). Moreover, Calderon et al., (2011) find that internally displaced women often face longer working hours without increased wages and experience

increased violence against them. This suggests that despite more favourable economic policies, greater public health service provision, and concentrated wealth in Colombia's urban areas, economic and conflict-driven migration, urban poverty, and violence have exacerbated health inequalities in these areas (Albuja & Ceballos, 2010; Calderon et al., 2011; Matthews et al., 2010).

Such urban heterogeneity is not identified by the DHS. One possible explanation for this is the sampling strategy of the DHS. The common sampling strategy of the DHS involved a two-stage cluster approach which requires an initial listing of household's part of the cluster and then a random selection of households for interview (Eelsey et al., 2018). Eelsey et al., (2018) find that first stage sampling frequently undercounts informal settlements given the impermanence of these households. This is significant for justice; the urban poor, who are more often Afro-Colombian women, are systematically underrepresented in surveys. The health issues of these women are obscured by those of the wealthy which severely limits the ability to develop truly equitable policy (Eelsey et al., 2018).

Education

My results highlight the significant contributions of formal education on women's reproductive health capability. Women with higher education had the highest scores in all dimensions, and sizeable benefits from secondary education were observed, particularly for health agency and empowerment. Even a basic level of education increases women's likelihood of receiving antenatal, delivery, and/or postnatal care. Moreover, education coefficients for all dimensions were larger than other significant effects, suggesting a strong (although complex) relationship between formal education and reproductive health capability. Perhaps this is not surprising as it is widely acknowledged that education has positive effects on influencing reproductive preferences, receiving sex education, contributing to gender equity between partners, and making use of health systems effectively either through increased empowerment, or the economic benefits of increased formal education (LeVine et al., 2011). In this way, we can consider formal education as its own capability, or a *fertile functioning* for Nussbaum (2011) and De-Shalit (2013) in that it enhances positive functionings, in this case reproductive health.

Importantly, our findings suggest that health system policies are not enough to determine women's capability to health and education is another important tool to influence better health. Our findings

also indicate the possibility that education acts as a fertile functioning: in that formal education, even at the level of primary, contributes positively to reproductive health capability, which in turn will provide opportunities for women to seek and achieve other life goals.

3.5. Concluding remarks

In conclusion, this exploratory analysis shows promising potential in the use of the DHS as a tool to measure health capability. Although the DHS was not designed to measure health equity, three out of five of my conceptual dimensions proved to be valid and reliable (healthcare, health agency and empowerment). Consequently, the empirical index has indicated disparities in Reproductive Health Capability for Colombian women along ethnic/racial, regional, educational, and age characteristics. Despite universal healthcare, it remains fragmented, and many women lack access to reproductive health services. Exploratory analysis has also found a novel, reliable and valid empirical index for health agency. This is particularly useful for future capability-based research using the DHS as health agency is fundamental to the capability approach despite the lack of operationalisation in previous research. With this health agency index, evidence is shown for deprivations in health agency scores for indigenous and rural women. It suggests that policy interventions must promote health-seeking behaviours, egalitarian relationships, and support for reproductive autonomy, as well as addressing access to healthcare.

However, two out of our five dimensions (health status and bodily integrity) performed poorly under reliability and validity tests. No variation in health status scores was shown between socio-demographic variables suggesting selected variables captured only rare events and not the general health status for women at the population level. Results for bodily integrity are harder to discern given that previous research shows contradicting associations between empowerment and domestic violence (Kiani et al., 2021). Where society has a high level of gender equality and men show empathy to women, adjust to women's empowerment, and contribute equally to household chores, domestic violence prevalence exists in the anomalies i.e. in unequal intimate relationships and women are less empowered (Schuler et al., 2013; Kiani et al., 2021). On the other hand, in societies with gender inequality, women who are empowered may threaten the status quo and disrupt men's social norms which may result in violent reactions (Kelly-Hanku et al., 2016; Kiani et al., 2021). My results showed white, urban, and women with more education with lower bodily integrity scores,

indicating the latter relationship of empowerment and domestic violence, however this result remains inconclusive.

Nevertheless, using the capability approach as a theoretical framework based on the freedom to achieve health establishes the importance of individual autonomy and capability enhancing conditions in implementing reproductive health policy.

Chapter 4: Conclusion

In this final chapter, I will summarise the main findings, highlight study limitations and identify areas for future research. The objective of this study was to address the need for better measurement of reproductive health inequities. To do so I developed a conceptual framework entitled Reproductive Health Capability that applied capability thinking to Reproductive Justice. I translated the conceptual framework into an empirical index and assessed the possibility of repurposing the DHS as a tool to measure health inequity, I assessed Reproductive Health Capability for women in Colombia.

4.1. Main findings

In my conceptual review of the reproductive health discourse, I identified the strengths and limitations of Reproductive Justice. To summarise, Reproductive Justice's ability to critique choice rhetoric so powerfully recognises the limitations of reproductive rights, specifically, they are too individualistic, unrealistic and stunted. In this critique, Reproductive Justice adopts a rhetoric of human rights which, for most contexts and issues, increases legibility of the reproductive oppressions experienced by discriminated and minority women. Moreover, as an intersectional theory, it reveals the multiple axes in which women experience discrimination. However, Reproductive Justice, to date, cannot operate as a complete and independent moral theory, nor can it apply itself to all contexts and issues without sensitivity.

Therefore, this study supports the application of Sen's capability approach to reproductive health, and to Reproductive Justice specifically. The capability approach is able to capture the very concerns of Reproductive Justice by recognising women's capability to health is dependent on internal and external conditions (Ruger, 2010). The capability approach is ethically individualistic in that its primary focus is the capability and wellbeing of the individual (Sen, 1999; Robeyns, 2005). This is important because childbearing and reproductive decision-making are incredibly personal, and commanding one's reproductive destiny is one of the main (although certainly not the only) mechanisms to gender equality (Sandoval, 2020). And thus reproductive health means more than just to be in good health, but also to exercise reproductive freedom. It is true that rights-based approaches have championed ideas of autonomy and gender equity but they may not be most appropriate in contexts with group-based cultural values that go beyond the individual, particularly so in developing countries

(Jayasundara, 2009). To advocate unlimited freedom would be unwise too, and would risk making the same errors as reproductive rights: not considering women's ability to actually achieve such rights. But as Robeyns' (2005) writes the capability approach is not ontologically individualistic, it too acknowledges the role of structures, institutions, informal social networks, and the like, on the individual. This is also critical as reproductive health has long been co-opted by state-led natalist policies that have influenced the way pregnancy and women's reproductive health have been viewed by women themselves, their communities, and society as a whole. In other words, reproductive health is both health and freedom; the most personal of decisions and a state objective for population control. It is individual women at the centre of the discourse that must have "*the right to be a parent, the right not to be a parent, and the right to parent with dignity and in a safe environment*" (Ross & Solinger, 2018:5). It is critical that states recognise the implications of their natalist policies, and that capability is what should be afforded to individuals. Capability to reproductive health speaks to all women because it is promoting freedom, but not so much that the barriers to exercising freedom are neglected – this is fundamental to achieving justice for those most vulnerable to discrimination.

In support of the application of capability thinking to Reproductive Justice, I have developed a conceptual framework that considers the relevant, objective, and universal capabilities a woman requires in order to be in good health. This comes in response to previous research that positions women's reproductive health as a capability to their overall wellbeing and while these evidence the gravity of reproductive health on women's wellbeing, little research is engaged in the resources, opportunities, and freedoms a woman needs to be in good reproductive health. I have proposed *health, healthcare, health agency, empowerment* and *bodily integrity*, and have justified their inclusion using capability and Reproductive Justice literature. This by no means an exhaustive list, and I welcome recommendations and debate on these capabilities. They are, however, compose the capability to achieve valued functionings; governments, policies, and health interventions must maintain each one in order to promote flourishing and just lives.

Translating Reproductive Health Capability into an empirical measure using the DHS, a standardised and internationally-used questionnaire, proved to be moderately successful. Three out of the five dimensions were found to be reliable and valid for internal and external consistency (*healthcare, health agency, and empowerment*). Hypothesised associations between these dimensions and socio-

demographic characteristics were found to be significant and in the predicted direction, demonstrating the empirical index does measure reproductive health justice as proposed by the conceptual framework. A noteworthy relationship between residence (urban or rural) and healthcare and health agency dimensions was found. Rural women, who are also more likely to be indigenous, experienced significant worse scores in both dimensions than urban women, who are more likely to be white, indicating discrimination experienced along multiple axes and deficiencies in ever-important reproductive health determinants.

However, two dimensions (*health status* and *bodily integrity*) performed poorly in external validity tests and did not confirm the expected hypotheses. While health status is of critical importance in the conceptual framework, empirical dimension scores showed no variation by socio-demographic characteristics. This suggests that health status questions in the DHS for maternal morbidity capture only rare events and do not indicate population-level pregnancy-related health status for all women. Bodily integrity, again another vital capability to women's reproductive health capability, performed poorly in known-group analysis. The results found women with higher education, who are white, and reside in urban and more economically developed areas, have generally lower scores in bodily integrity than their counterparts. Consequently, these two dimensions were removed and analysed reproductive health capability for women in Colombia based on the remaining three dimensions (healthcare, health agency, and empowerment).

A particularly noteworthy contribution of this study is the development of an empirical index for reproductive health agency from the DHS. The concept of health agency is under-developed and remains ambiguous in empirical studies (Kristiansen, 2014). Oftentimes, the term empowerment is used to capture elements of an individual's agency. It has been highlighted, however, that these are two distinct concepts and empirical measurements must reflect this. Despite health agency having no coherent and widely-used empirical assessment, health agency can be disaggregated into sub-components: *health knowledge*, *social norms*, *reproductive autonomy*, and *decision-making ability*, all of which have been assessed in relation to reproductive health. This shows promise in evaluating women's ability to actualise opportunities to health and translate their empowering status into health functionings. At the same time, it may point to discrepancies between empowerment and bodily integrity i.e. greater opportunity expansion in regards to health, but disempowering conditions

indicate poor quality of opportunity. Critically, it aids in locating injustice in women's reproductive health.

This project has argued for a capability-based approach to reproductive health to guide effective and suitable policy. The capability approach argues that reproductive health cannot be improved without recognising the conditions that determines women's reproductive health. This research has shown that interventions to improve Colombia's fragmented health system is only one option, the importance of health agency is key to translating opportunities into real-life health-affirming actions. Moreover, it has argued for dignity and freedom to be central to conceptualisations of reproductive health and to avoid framing reproductive health in deprivations of rights or material resources models. Applying capability thinking to Reproductive Justice has enabled us to evaluate the degree to which women are capable of improving their reproductive health, and those women who still experience oppression and discrimination.

4.2. Limitations of study and future research

This study had several limitations. Mainly, I was limited by the type of research I could undertake; due to COVID, I was unable to conduct qualitative work to select relevant capabilities that women had reason to value; this would have provided additional depth and richness to the conceptual framework. This also impacted our weighting selection in our index. Choosing equal weighting was a suitable response to the limitations and provides an agnostic and least controversial view but I did not determine the weights to be used at individual aggregation losing the strength of the capability approach.

Moreover, it was acknowledged above that the removal of "*complications during pregnancy*" variables for the Health Status dimension due to weak correlations between them and the underlying construct led to a partial assessment of maternal morbidity and thus women's ability to seek reproductive health. This has resulted in an empirical instrument that is inconsistent with the conceptual framework developed to articulate justice in reproductive health. Naturally, this raises doubts over this instrument, and also the DHS's ability to measure justice. This point will be explored further below. Meanwhile, we can consider the effect of recall bias on these variables. The DHS adopts a 5-year recall period for pregnancy which while increases sample size, it also results in potentially greater

recall issues, compared to other well-known and widely used surveys such as the Multiple Indicator Cluster Surveys (MICS) which use a 2-year recall period (Hancioglu & Arnold, 2013). A longer recall period may have resulted in an underestimation of particular responses, due to a high proportion of missing and 'don't know' responses. This will have impacted the validity of the data (Eisele et al., 2013). This is important too because many women have unmet educational needs regarding health during pregnancy, particularly in low- and middle-income countries (Nikiema et al., 2009). These variables rely on women's ability not just to remember complications, but to recognise them. Complications *during* pregnancy, as opposed to those in delivery and postpartum, may not be diagnosed as women are not entering a healthcare facility as often nor are they in a healthcare facility if/when the complication arises. Knowing whether women do in fact have an unmet educational need is important to understand women's experience of healthcare, and their health agency.

Potential for recall bias may have also contributed to the invalid bodily integrity dimension, as self-reported data can lead to an underestimation of abuse incidents, where systematically less empowered women may have lower subjective notions of issues around their bodily integrity. Further, although the DHS interviews women who have obtained privacy, there is no real guarantee of this, and thus may lead to women giving inaccurate responses. The nature of these questions is of course extremely personal and where abuse occurs, the implications for the respondent to divulge such information would be significant. The potential for recall bias is an inherent limitation of the DHS and thus this study.

One will note that these questions (experience of intimate partner violence, and complications during pregnancy) also capture more 'rare' events. Hence, another study limitation and limitation of the DHS is the availability of specific questions. For example, it was acknowledged earlier the relevance and importance of nutritional status for pregnant women and mothers. The DHS asks many useful questions regarding nutrition intake for children, it does not for pregnant women or mothers however. Using child nutrition intake as an indicator for mother's nutrition status would be inaccurate as past research suggests mother prioritise their children at mealtimes, particularly so in poorer households (Jovanovski & Cook, 2020). A useful development in the DHS would be to extend their nutrition questions for all those in the household. Limitations of available questions in the DHS have also been discussed in regard to Healthcare, where capability- and justice- relevant questions in dignity and

autonomy, discrimination, and patient experience, and care intervention results are not available. Where the DHS does provide useful questions regarding patient experience, they are reserved for women who did not receive care and the reason for why they did not. This is an example of where the DHS's skip pattern proves limiting. Asking a respondent why they did not receive care provides illuminating information. Gaining a perspective of quality care is vital for women's health and Reproductive Justice. It must not be assumed that access to care means access to quality care. My results have shown Healthcare as the dimension with the highest scores for women of all ethnicities and races. However, given that literature (also supported by my findings) shows significant socioeconomic and health inequities between groups it is unlikely that women in Colombia experience healthcare similarly. Again, we know that Colombia's healthcare system is geographically and economically fragmented. The DHS skip pattern results in many very useful variables but with large amounts of missing data. For a population-level analysis, this severely limits the ability to measure justice-based concerns.

This leads to the final empirical limitation of this instrument and of the DHS, which is a question of how well can the DHS capture justice. Of course, the DHS was not designed to fully capture women's Reproductive Health Capability and therefore its inability to do so is not a criticism as such. Nevertheless, as efforts towards measuring inequity progress, it is important we consider the potential for a widely used survey to identify injustice in reproductive health. Perhaps, the most significant limitation of this instrument is in its inability to fully capture the key tenets of Reproductive Justice and Health Capability. To remind the reader, Reproductive Justice makes a very strong case for the representation of minority women. This study has only considered women of different ethnicities and races, educational background, region, and age. Sexuality, migration status, and disability are all vital identifiers of possible discrimination and injustice. Furthermore, Reproductive Justice stresses the importance of intersectional analysis. Future research can use this empirical index to measure intersectional capability to reproductive health. This study did not do this, in part, due to limited available DHS indicators at a representational scale. In this way, the empirical index does not fully evaluate reproductive health injustice for women in Colombia. However, reworking indicators to reflect women's capability does provide a more nuanced and holistic understanding of women's reproductive health status in pregnancy.

A theoretical limitation of this study is that the capability approach is an incomplete theory (Alkire, 2005). Sen's theory is objective and refuses to provide a complete set of capabilities, nor does he provide instructions on how to decide and evaluate chosen capabilities (Alkire, 2005; Jayasundara, 2009). He argues that to do so would run the risk of being too rigid, prescriptive, and over-specific (Alkire, 2005; Jayasundara, 2009). Moreover, as an incomplete theory, it remains open and flexible; too flexible to many different interpretations of the theory's concepts. Naturally, translating capabilities into empirical research means a researcher's background and values influence the use of the concept, affecting the theory's validity and objectivity (Alkire, 2005; Jayasundara, 2009). I acknowledge my own positionality as a researcher and thus the influence of my values and personal bias in choosing capabilities, despite being guided by literature. I decided to choose capabilities based on their objectivity, relevance, and universality due to the limitations granted by COVID-19 and to address the need for spatial-temporal equity analysis across countries. These capabilities are inherently limited because of this. However, to avoid researcher bias in empirical development of Reproductive Health Capability, I used data-driven techniques such as Factor Analysis to select index variables. Furthermore, data-driven techniques meant chosen variables were relevant to the study site and were able to capture, at least in part, the capability of women in Colombia.

I have conducted exploratory data analysis and provided promising beginning work in the operationalisation of a capability to reproductive health. Future research could include conducting explicitly intersectional analysis i.e., assessing the influence of multiple socio-demographic identifiers on women's reproductive health. This would greatly improve the legibility of injustices experienced by discriminated women and thus influence effective policy. Using the DHS, it is possible for future work to assess longitudinal changes in Reproductive Health Capability, another important facet of health equity measurement and monitoring. Moreover, future work could further develop and improve maternal morbidity and mother's health status variables in the DHS. Finally, this index can be used to assess women's overall wellbeing i.e., whether women's reproductive capability has afforded women improvements in their overall wellbeing. Given that this index has additional dimensions to reproductive health, compared to previous studies, future research could use this index to evaluate the role of women's reproductive health capability on women's health and wellbeing throughout her life course.

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Appendices

Appendix 1. Health Status: Initial selection of variables from the DHS.

<i>No.</i>	<i>DHS Code</i>	<i>n</i>	<i>mean</i>	<i>sd</i>	<i>median</i>	<i>min</i>	<i>max</i>	<i>skew</i>	<i>kurtosis</i>	<i>se</i>
1	s438a_1	7225	2.53	0.81	3	1	3	-1.25	-0.31	0.01
2	s438b_1	7225	2.49	0.86	3	1	3	-1.12	-0.71	0.01
3	s438c_1	7225	2.50	0.85	3	1	3	-1.15	-0.63	0.01
4	s438d_1	7225	2.47	0.88	3	1	3	-1.07	-0.85	0.01
5	s438e_1	7225	2.56	0.77	3	1	3	-1.34	0.01	0.01
6	s438f_1	7225	2.48	0.88	3	1	3	-1.09	-0.81	0.01
7	s438g_1	7225	2.47	0.88	3	1	3	-1.07	-0.85	0.01
8	s438h_1	7225	2.49	0.87	3	1	3	-1.11	-0.74	0.01
9	s438i_1	7225	2.52	0.83	3	1	3	-1.21	-0.43	0.01
10	s438j_1	7225	2.49	0.86	3	1	3	-1.12	-0.71	0.01
11	s438x_1	7225	2.49	0.86	3	1	3	-1.14	-0.66	0.01
12	s441_1	7225	2.36	0.84	3	1	3	-0.75	-1.15	0.01
13	s444a_1	7225	1.21	0.41	1	1	2	1.42	0.02	0.00
14	s444b_1	7225	1.21	0.41	1	1	2	1.42	0.02	0.00
15	s444c_1	7225	1.04	0.20	1	1	2	4.65	19.61	0.00
16	s444d_1	7225	1.01	0.11	1	1	2	8.80	75.46	0.00
17	s444e_1	7225	1.05	0.22	1	1	2	4.03	14.24	0.00
18	s445_1	7225	1.13	0.33	1	1	2	2.25	3.04	0.00
19	s452a_1	7225	1.10	0.30	1	1	2	2.65	5.00	0.00
20	s452b_1	7225	1.03	0.17	1	1	2	5.63	29.67	0.00
21	s452c_1	7225	1.10	0.30	1	1	2	2.64	4.97	0.00
22	s452d_1	7225	1.06	0.23	1	1	2	3.79	12.38	0.00
23	s452e_1	7225	1.10	0.30	1	1	2	2.69	5.24	0.00
24	s452f_1	7225	1.09	0.29	1	1	2	2.88	6.31	0.00
25	s452g_1	7225	1.03	0.17	1	1	2	5.45	27.74	0.00
26	s452h_1	7225	1.10	0.29	1	1	2	2.76	5.62	0.00

Appendix 2. Healthcare: Initial selection of variables from the DHS.

1. Antenatal care

No.	DHS Code	n	mean	sd	median	min	max	skew	kurtosis	se
1	m1_1	6536	1.47	0.70	2	1	2	-0.96	-0.39	0.01
2	m2a_1	7225	1.91	0.29	1	1	2	-2.83	6.03	0.00
3	m2b_1	7225	1.35	0.48	1	1	2	0.62	-1.62	0.01
4	m2c_1	7225	1.03	0.18	1	1	2	5.15	24.52	0.00
5	m13_1	6950	2.79	0.46	3	1	3	-2.04	3.44	0.01
6	m14_1	7147	1.37	0.55	1	1	2	-0.12	-0.83	0.01
7	m42a_1	6964	1.99	0.12	1	1	2	-8.08	63.27	0.00
8	m42c_1	6964	1.99	0.12	1	1	2	-8.08	63.27	0.00
9	m42d_1	6964	1.96	0.20	1	1	2	-4.48	18.10	0.00
10	m42e_1	6964	1.96	0.19	1	1	2	-4.93	22.34	0.00
11	m43_1	5745	1.92	0.30	2	1	3	-2.17	5.85	0.00
12	m44_1	5703	1.91	0.29	1	1	2	-2.82	5.94	0.00
13	m45_1	7212	1.94	0.24	1	1	2	-3.57	10.78	0.00
14	m49y_1	7183	1.00	0.07	1	1	2	14.65	212.61	0.00
15	m57e_1	6964	1.61	0.49	1	1	2	-0.44	-1.81	0.01
16	m57m_1	6964	1.05	0.21	1	1	2	4.24	16.02	0.00

2. Postnatal and delivery care

No.	DHS Code	n	mean	sd	median	min	max	skew	kurtosis	se
17	m57n_1	6964	1.33	0.47	1	1	2	0.74	-1.45	0.01
18	m57o_1	6964	1.01	0.11	1	1	2	9.05	79.91	0.00
19	m57p_1	6964	1.00	0.02	1	1	2	48.14	2315.67	0.00
20	m57x_1	6964	1.01	0.08	1	1	2	11.92	140.05	0.00
21	m3a_1	7225	1.91	0.28	2	1	2	-2.97	6.84	0.00
22	m3b_1	7225	1.61	0.49	2	1	2	-0.46	-1.79	0.01
23	m3c_1	7225	1.33	0.47	1	1	2	0.72	-1.49	0.01
24	m3g_1	7225	1.02	0.15	1	1	2	6.25	37.02	0.00
25	m3h_1	7225	1.04	0.20	1	1	2	4.69	20.04	0.00
26	m3k_1	7225	1.05	0.22	1	1	2	4.07	14.58	0.00
27	m3n_1	7225	1.01	0.08	1	1	2	12.41	152.03	0.00
28	m15_1	7225	1.48	0.87	1	1	2	0.79	-0.27	0.01
29	s449_1	7021	1.95	0.22	1	1	2	-4.05	14.39	0.00

Appendix 3. Health Agency: Initial selection of variables from the DHS

<i>No.</i>	<i>DHS Code</i>	<i>n</i>	<i>mean</i>	<i>sd</i>	<i>median</i>	<i>min</i>	<i>max</i>	<i>skew</i>	<i>kurtosis</i>	<i>se</i>
1	v384a	7225	1.48	0.50	1.00	1.00	2.00	0.07	-1.99	0.01
2	v384b	7225	1.73	0.44	2.00	1.00	2.00	-1.03	-0.95	0.00
3	v384c	7225	1.50	0.50	2.00	1.00	2.00	-0.02	-2.00	0.01
4	v525	7225	18.64	13.80	16.00	8.00	96.00	5.22	26.34	0.14
5	v743a	7225	2.65	0.64	3.00	1.00	3.00	-1.62	1.26	0.01
6	v750	7225	1.96	0.19	2.00	1.00	2.00	-5.01	23.14	0.00
7	v761	6647	1.17	0.37	1.00	1.00	2.00	1.80	1.22	0.00
8	s638a	5780	2.23	0.82	2.00	1.00	3.00	-0.44	-1.36	0.01
9	s722	7225	1.97	0.18	2.00	1.00	2.00	-5.16	24.63	0.00
10	s814g	7225	2.31	0.59	2.00	1.00	3.00	-0.18	-0.61	0.01
11	s1243	5780	1.95	0.21	2.00	1.00	2.00	-4.25	16.08	0.00
12	s501	7225	1.93	0.25	2.00	1.00	2.00	-3.47	10.03	0.00
13	s1301b	7225	2.15	0.91	2.00	1.00	3.00	-0.30	-1.72	0.01
14	s1301c	7225	1.88	0.93	2.00	1.00	3.00	0.24	-1.79	0.01
15	s1301f	7225	1.77	0.95	1.00	1.00	3.00	0.46	-1.72	0.01
16	s1301h	7225	1.70	0.90	1.00	1.00	3.00	0.62	-1.49	0.01
17	s1301j	7225	2.80	0.58	3.00	1.00	3.00	-2.62	5.14	0.01
18	s1302f	7225	2.47	0.84	3.00	1.00	3.00	-1.06	-0.75	0.01
19	s1302g	7225	2.22	0.90	3.00	1.00	3.00	-0.46	-1.61	0.01
20	m10_1	7225	1.79	0.82	2.00	1.00	3.00	0.40	-1.41	0.01

Appendix 4. Empowerment: Initial selection of variables from the DHS

No.	DHS Code	n	mean	sd	median	min	max	skew	kurtosis	se
1	v131	7225	5.13	1.77	6	1	6	-1.81	1.46	0.02
2	v731	7225	2.09	0.91	2	1	3	-0.18	-1.78	0.01
3	v739	5879	1.38	0.63	1	1	5	2.27	7.48	0.01
4	v741	6223	2.03	0.38	2	1	4	1.79	10.79	0.00
5	v743b	7225	3.25	1.10	3	1	6	0.90	0.01	0.01
6	v743c	7225	3.06	1.11	3	1	6	1.11	0.40	0.01
7	v743d	7225	2.94	0.92	3	1	6	1.12	1.88	0.01
8	v743e	7225	2.68	1.08	2	1	6	1.75	2.41	0.01
9	v743f	5879	3.49	1.13	3	2	8	0.93	0.71	0.01
10	v744a	7225	1.02	0.15	1	1	3	7.84	66.91	0.00
11	v744b	7225	1.04	0.21	1	1	3	5.31	30.11	0.00
12	v744c	7225	1.02	0.15	1	1	3	8.77	85.24	0.00
13	v744d	7225	1.01	0.13	1	1	3	9.94	109.71	0.00
14	v744e	7225	1.02	0.14	1	1	3	9.33	96.66	0.00
15	v746	5879	2.38	1.00	2	1	6	1.48	2.01	0.01
16	s814f	7225	2.42	0.90	2	1	6	1.33	2.90	0.01
17	s1274f	7225	2.08	0.94	2	1	3	-0.16	-1.84	0.01
18	s1274g	7225	2.52	0.80	3	1	3	-1.22	-0.33	0.01
19	s1274i	7225	1.50	0.83	1	1	3	1.15	-0.58	0.01
20	s1301a	7225	1.95	0.97	2	1	3	0.10	-1.92	0.01
21	s1301d	7225	1.11	0.43	1	1	3	3.97	14.26	0.01
22	s1301e	7225	1.73	0.94	1	1	3	0.56	-1.62	0.01
23	s1301g	7225	1.58	0.87	1	1	3	0.92	-1.04	0.01
24	s1301i	7225	1.22	0.59	1	1	3	2.52	4.57	0.01
25	s1301l	7225	2.22	0.94	3	1	3	-0.45	-1.73	0.01
26	s1302a	7225	2.12	0.95	3	1	3	-0.25	-1.85	0.01
27	s1302b	7225	1.55	0.87	1	1	3	1.00	-0.93	0.01
28	s1302c	7225	2.50	0.83	3	1	3	-1.14	-0.57	0.01
29	s1302e	7225	2.56	0.80	3	1	3	-1.36	-0.05	0.01
30	s1302h	7225	2.88	0.44	3	1	3	-3.74	12.55	0.01
31	s1304a	7225	1.78	1.02	1	1	6	1.37	2.22	0.01
32	s1304b	7225	4.22	1.41	5	1	6	-1.14	0.30	0.02
33	s1304c	7225	1.65	1.06	1	1	6	1.90	3.93	0.01
34	s1304d	7225	2.04	1.61	1	1	6	1.51	1.06	0.02
35	s1304e	7225	1.54	1.03	1	1	6	2.23	5.37	0.01
36	s1304f	7225	2.92	1.36	3	1	6	0.13	-0.73	0.02
37	s1304g	7225	3.73	1.68	4	1	6	-0.33	-1.12	0.02
38	s1304h	7225	5.22	1.66	6	1	6	-1.80	1.54	0.02
39	s1308a	7075	1.72	1.02	1	1	6	1.64	3.21	0.01
40	s1308b	7075	1.71	0.95	1	1	6	1.18	1.26	0.01
41	s1308c	7075	3.61	2.17	3	1	6	-0.03	-1.74	0.03
42	s1308d	7075	2.95	1.60	3	1	6	0.63	-0.37	0.02
43	s1308e	7075	3.65	2.12	3	1	6	-0.01	-1.69	0.03

Appendix 5. Bodily integrity: Initial selection of variables from the DHS.

No.	DHS Code	n	mean	sd	median	min	max	skew	kurtosis	se
1	d101b	7225	1.26	0.44	1	1	2	1.1	-0.79	0.01
2	d101c	7225	1.19	0.4	1	1	2	1.54	0.38	0
3	d101d	7225	1.09	0.28	1	1	2	2.92	6.54	0
4	d101e	7225	1.24	0.43	1	1	2	1.21	-0.53	0.01
5	d103c	7225	1.18	0.38	1	1	2	1.66	0.76	0
6	d103d	7225	1.12	0.33	1	1	2	2.33	3.43	0
7	d103e	7225	1.14	0.34	1	1	2	2.13	2.52	0
8	d105a	7225	1.24	0.43	1	1	2	1.24	-0.47	0.01
9	d105b	7225	1.17	0.38	1	1	2	1.73	0.99	0
10	d105c	7225	1.04	0.19	1	1	2	4.87	21.69	0
11	d105d	7225	1.05	0.23	1	1	2	3.92	13.39	0
12	d105e	7225	1.03	0.17	1	1	2	5.71	30.61	0
13	d105f	7225	1.04	0.21	1	1	2	4.42	17.55	0
14	d105g	7225	1.01	0.12	1	1	2	8.07	63.16	0
15	d105h	7225	1.04	0.2	1	1	2	4.54	18.65	0
16	d106	7225	1.27	0.44	1	1	2	1.05	-0.9	0.01
17	d107	7225	1.09	0.28	1	1	2	2.9	6.38	0
18	d108	7225	1.04	0.2	1	1	2	4.54	18.65	0
19	d110a*	1995	1.44	0.5	1	1	2	0.24	-1.94	0.01
20	d110d*	1995	1.08	0.27	1	1	2	3.11	7.7	0.01
21	d110e*	1995	1.21	0.41	1	1	3	1.43	0.11	0.01
22	d110f*	1995	1.02	0.13	1	1	2	7.34	51.96	0
23	d110g*	1995	1.01	0.09	1	1	2	11.02	119.57	0
24	d110h*	4451	1.08	0.28	1	1	3	3.02	7.29	0
25	d115y	7225	1.1	0.3	1	1	2	2.64	4.95	0
26	d118y	7225	1.08	0.27	1	1	2	3.19	8.17	0
27	d124	7225	1.05	0.21	1	1	2	4.36	17	0
28	s1235	7225	1.04	0.2	1	1	2	4.52	18.42	0
29	s1237	7225	1.02	0.13	1	1	2	7.37	52.34	0
30	s1239	7225	1.1	0.3	1	1	2	2.63	4.94	0
31	s1243	7225	1.05	0.21	1	1	2	4.37	17.14	0
32	s1254	7225	1	0.05	1	1	2	20.54	419.89	0
33	s1257	7225	1.15	0.36	1	1	2	1.94	1.78	0
34	s1259	7225	1.46	0.5	1	1	2	0.17	-1.97	0.01

Appendix 6: Recode Tables. Tables showing full DHS questions in Spanish, English, DHS variable codes, DHS response codes, and re-codes.

i. Health Status

DHS Questions (in Spanish)	DHS Questions (in English)	DHS Code	DHS Response Codes	Recodes
En el momento del nacimiento de (NOMBRE), usted tuvo alguna de las siguientes complicaciones:	At the time of (NAME) was born, you had any of the following complications:			
¿Labor prolongada, es decir, las contracciones fuertes y regulares duraron más de 12 horas?	Prolonged labour, that is, contractions strong and regular lasted more than 12 hours?	s444a_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Sangrado excesivo después del parto?	Excessive bleeding after delivery?	s444b_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Fiebre alta con sangrado vaginal que oía mal?	High fever with bad smelling vaginal bleeding?	s444c_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Convulsiones no causadas por fiebre?	Seizures not caused by fever?	s444d_1	1 = No 2 = Yes	1 = No 2 = Yes
Como consecuencia del parto, durante los 40 días después del parto, tuvo usted alguno de los siguientes problemas:	As a result of childbirth, during the 40 days after delivery, did you have any of the following problems:			
¿Sangrado intenso de la vagina?	Heavy bleeding from the vagina?	s452a_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Desmayo o pérdida de conciencia?	Fainting or loss of consciousness?	s452b_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Fiebre, temperatura alta o escalofríos?	Fever, high temperature, or chills?	s452c_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Infección de los senos?	Breast infection?	s452d_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Dolor y ardor al orinar?	Pain and burning when urinating?	s452e_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Flujos o líquidos vaginales?	Vaginal fluids or fluids?	s452f_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Pérdida involuntaria de orina?	Involuntary leakage of urine?	s452g_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Depresión posparto?	Postpartum depression?	s452h_1	1 = No 2 = Yes	1 = No 2 = Yes

ii. Healthcare: Antenatal care

<i>DHS Questions (in Spanish)</i>	<i>DHS Questions (in English)</i>	<i>DHS code</i>	<i>DHS Response Codes</i>	<i>Recodes</i>
En alguno de sus controles, le hicieron algo de lo siguiente	In some of the prenatal visits, did they do the following:			
¿Le tomaron la presión arterial?	Did they take your blood pressure?	m42c_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Le tomaron una muestra de sangre?	Did they take a blood sample?	m42e_1	1 = No 2 = Yes	1 = No 2 = Yes
¿La pesaron?	Weigh you?	m42a_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Le pidieron una muestra de orina?	Did they ask you for a urine sample?	m42d_1	1 = No 2 = Yes	1 = No 2 = Yes
	Additional information			
¿Cuando Ud. estaba embarazada de (NOMBRE) le aplicaron alguna vacuna para prevenir al bebé contra el tétanos, es decir, convulsiones después del nacimiento?	When you were pregnant with (NAME), did they apply any vaccine to prevent the baby against tetanus, that is, seizures after of birth?	m1_1	0 – 8	1 = 0-4 2 = 5+
¿Cuando Ud. estaba embarazada de (NOMBRE) se hizo control prenatal (se chequeó el embarazo alguna vez)? "SI", ¿Con quién se chequeó ? Medico/a?	When you were pregnant with (NAME), did you have prenatal care (was your pregnancy ever checked)? "YES", with whom did you check? Doctor?	m2a_1	1 = No 2 = Yes	1 = No 2 = Yes
¿Durante este embarazo, le prescribieron hierro?	During this pregnancy, were you prescribed iron?	m45_1	1 = No 2 = Yes 3 = Don't know	1 = No, Don't Know 2 = Yes
	Timing and Number of Visits			
¿Cuántos meses de embarazo tenía Ud. cuando recibió su primer control prenatal?	How many months pregnant were you when you received your first prenatal checkup?	m13_1	0 – 9 98 = Don't know	1 = 7-9 2 = 4-6 3= 0-3
¿Cuántos controles prenatales tuvo Ud. durante ese embarazo?	How many prenatal checkups did you have during that pregnancy?	m14_1	0 – 20 98 = Don't know	1 = 0-8 2= 8+

iii. Healthcare: Delivery and postpartum care

<i>DHS Questions (in Spanish)</i>	<i>DHS Questions (in English)</i>	<i>DHS Code</i>	<i>DHS Response Codes</i>	<i>Recodes</i>
¿Dónde tuvo lugar el parto?	Where did the delivery take place?	m15_1	2 = Respondent/other's home 4 = government hospital/health centre/health post 6 = private hospital/clinic 7 = EPS health centre 8 = other	1 = respondent/other home, other 2 = government hospital. Private hospital. EPS health centre
¿Quién le atendió el parto de (NOMBRE)?	Who attended you at the delivery of (NAME)? Traditional birth assistant	m3g_1	1 = No / 2 = Yes	1 = No / 2 = Yes
¿Quién le atendió el parto de (NOMBRE)?	Who attended you at the delivery of (NAME)? Relative or friend	m3h_1	1 = No / 2 = Yes	1 = No / 2 = Yes
¿Quién le atendió el parto de (NOMBRE)? ENFERMERO(A)	Who attended you at the delivery of (NAME)? Nurse	m3b_1	1 = No / 2 = Yes	1 = No / 2 = Yes
¿Quién le atendió el parto de (NOMBRE)? MÉDICO(A).	Who attended you at the delivery of (NAME)? Doctor	m3a_1	1 = No / 2 = Yes	1 = No / 2 = Yes
¿Quién le atendió el parto de (NOMBRE)? AUXILIAR DE ENFERMERÍA	Who attended you at the delivery of (NAME)? Auxiliary midwife	m3c_1	1 = No / 2 = Yes	1 = No / 2 = Yes
¿Quién chequeó su salud en ese momento?	Who checked your health at that time?	m68_1	2 = Doctor 3 = Nurse/midwife 4 = Auxiliary midwife 6 = Traditional birth attendant 8 = Other	1 = traditional birth assistant, other 2 = doctor, nurse midwife, auxiliary midwife
¿Dónde tuvo lugar este chequeo?	Where did this check take place?	m69_1	5 = government hospital 7 = private hospital, clinic 8 = eps health centre 9 = private doctor 10 = profamilia 11 = other	1 = profamilia, eps health centre, other 2 = government hospital, pr

iv. Health Agency

<i>Full DHS Questions (in Spanish)</i>	<i>Full DHS Questions (in English)</i>	<i>DHS Code</i>	<i>DHS Response Codes</i>	<i>Recodes</i>
	Knowledge of family planning			
En los últimos 12 meses Ud.: ¿Ha visto acerca de anticoncepción en la televisión?	In the last 12 months you: Have you heard about contraception on the television?	v384a	1 = No / 2 = Yes	1 = No / 2 = Yes
¿Ha oído hablar acerca de anticoncepción en la radio?	Have you heard about contraception on the radio?	v384b	1 = No / 2 = Yes	1 = No / 2 = Yes
¿Ha leído acerca de anticoncepción en periódicos/ revistas/internet?	Have you read about contraception in newspapers/magazines/internet?	v384c	1 = No / 2 = Yes	1 = No / 2 = Yes
	Sexual health practices			
¿Ha oído hablar de ITS?	Have you heard of sexually transmitted diseases (STDs)?	v750	1 = No / 2 = Yes	1 = No / 2 = Yes
¿Ud. aprueba o desaprueba que las parejas usen un método para evitar quedar embarazadas?	Do you approve or disapprove of couples using a method to avoid getting pregnant?	s722	1 = Approve 2 = Disapprove 3 = No opinion	1 = Disapprove 2 = No opinion 3 = Approve
Quién en su hogar tiene la última palabra en las siguientes decisiones: ¿El cuidado de su salud?	Who in your household has the last word in the following decisions: Taking care of your health?	v743a	1 = No one 2 = Respondent alone 3 = Respondent and husband/partner 4 = Respondent and other person 5 = Husband/partner alone 6 = Someone else 7 = Other	1 = No one, Husband/partner alone, Someone else 2 = Respondent and husband/partner 3 = Respondent alone
¿Alguna vez en la vida ha recibido u obtenido información sobre temas o asuntos relacionados con la sexualidad?	Have you ever received or obtained information on topics or issues in your life related to sex?	s502	1 = No / 2 = Yes	1 = No / 2 = Yes
	Women's sexual norms			
Por favor dígame si Ud. está de acuerdo, ni de acuerdo ni en desacuerdo o en desacuerdo con las siguientes frases sobre las relaciones entre los hombres y las mujeres: La mujer se debe casar virgen	Please tell me if you agree, neither agree nor disagree or disagree with the following statements about relationships between men and women: A woman must be a virgin at marriage"	s1302f	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Son las mujeres quienes deben tomar las precauciones para no embarazarse	It is women who must take precautions not to get pregnant	s1301f	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Sería un atrevimiento que la mujer pida usar condón	It would be daring for a woman to ask to use a condom."	s1301j	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
La masturbación es cosa de hombres	Masturbation is a man's thing	s1302g	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
	Men's sexual norms			
Los hombres necesitan más sexo que las mujeres	Men need more sex than women	s1301b	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Los hombres siempre están listos para tener sexo	Men are always ready for sex	s1301h	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Los hombres no hablan de sexo, lo hacen	Men don't talk about sex, they do	s1301c	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
	Reproductive autonomy			

<p>Quién en su hogar tiene la última palabra en las siguientes decisiones: ¿Tener relaciones sexuales?</p>	<p>Who has the final say regarding sexual intercourse</p>	<p>s814g</p>	<p>1 = No one 2 = Respondent alone 3 = Respondent and husband/partner 4 = Respondent and other person 5 = Husband/partner alone 6 = Someone else 7 = Other</p>	<p>1 = No one, Husband/partner alone, Someone else 2 = Respondent and husband/partner 3 = Respondent alone</p>
<p>¿Cuando usted quedó embarazada, quería quedar embarazada EN ESE MOMENTO, quería esperar hasta MÁS ADELANTE, o NO QUERÍA MÁS hijos?</p>	<p>When you got pregnant, did you want to get pregnant right then, did you want to wait until later, or did you not want any more children?</p>	<p>m10_1</p>	<p>1 = then 2 = later 3= no more</p>	<p>1 = later, no more 2 = then</p>

v. Empowerment

<i>DHS Questions (in Spanish)</i>	<i>DHS Questions (in English)</i>	<i>DHS Code</i>	<i>DHS Response Codes</i>	<i>Recodes</i>
Por favor dígame si Ud. está de acuerdo, ni de acuerdo ni en desacuerdo o en desacuerdo con las siguientes frases sobre las relaciones entre los hombres y las mujeres: Los hombres son la cabeza del hoga	Please tell me if you agree, neither agree nor disagree or disagree with the following statements about relationships between men and women: "Men are the head of the house."	s1302a	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Una mujer necesita un hombre para ser feliz	"A woman needs a man to be happy."	s1302b	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Los hombres necesitan de una mujer en la casa	"Men need a woman in the house."	s1302c	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Cuando se tienen que tomar las decisiones en la casa, los hombres tienen la última palabra	"When decisions have to be made at home, the men have the last word."	s1301g	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Cambiar pañales, bañar a los(as) niños(as) y alimentarlos es responsabilidad de las mujeres.	"Changing diapers, bathing children and feeding them is women's responsibility."	s1301e	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Una mujer debe aguantar la violencia del marido para mantener su familia unida	"A woman must endure the violence of her husband to maintain her family."	s1301i	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Una buena esposa obedece a su esposo siempre	"A good wife obeys her husband always."	s1274f	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Una mujer puede escoger sus amistades aunque a su pareja no le guste	"A woman can choose her friends although her partner doesn't like it."	s1274g	1 = Disagree 2 = Neither 3 = Agrees	1 = Disagree 2 = Neither 3 = Agrees
Es normal que los hombres no dejen salir sola a su pareja.	"It is normal that men do not let their partner go out alone."	s1274i	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
El papel más importante de las mujeres es cuidar su casa y cocinar para su familia.	"The most important role of women is to take care of their home and cook for your family."	s1301a	1 = Disagree 2 = Neither 3 = Agrees	1 = Agrees 2 = Neither 3 = Disagrees
Quién en su hogar tiene la última palabra en las siguientes decisiones: ¿Estudiar?	Who in your household has the last word in the following decisions: To study?	s814f	1 = No one 2 = Respondent alone 3 = Respondent and husband/partner 4 = Respondent and other person 5 = Husband/partner alone 6 = Someone else 7 = Other	1 = No one, Husband/partner alone, Someone else 2 = Respondent and husband/partner 3 = Respondent alone

N.B. s1274g row is highlighted in purple to identify to the reader an exception in re-coding.

vi. Bodily Integrity

<i>Full DHS Questions (in Spanish)</i>	<i>Full DHS Questions (in English)</i>	<i>DHS Code</i>	<i>DHS Response Codes</i>	<i>Recodes</i>
<p>Le voy a preguntar acerca de algunas situaciones que les suceden a algunas mujeres. Por favor, dígame si estas situaciones se han presentado (presentaron) en su relación con su actual o última pareja</p> <p>i. ¿La ha atacado (atacó) con un cuchillo, arma de fuego u otra arma?</p> <p>ii. ¿Ha tratado (trató) de estrangularla o de quemarla?</p> <p>iii. ¿La ha pateado (la pateó) o arrastrado (arrastró)?.</p>	<p>I am going to ask you about some situations that happen to some women. Tell me please whether these situations have arisen (occurred) in your relationship with your current or last partner</p> <p>i. Have they attacked you with a knife, firearm, or other weapon?</p> <p>ii. Have they tried to strangle or burn you?</p> <p>iii. Have they kicked or dragged you?</p>	d107	<p>1 = Never 2 = Yes, last year 3 = Yes, before last year</p>	<p>1 = Never 2 = Yes, last year / Yes, before last year</p>
<p>Le voy a preguntar acerca de algunas situaciones que les suceden a algunas mujeres. Por favor, dígame si estas situaciones se han presentado (presentaron) en su relación con su actual o última pareja :</p> <p>i. ¿La ha empujado (la empujó) o zarandeado (zarandéo)?</p> <p>ii. ¿La ha golpeado (la golpeó) con la mano?</p> <p>iii. ¿La ha golpeado (la golpeó) con un objeto?</p>	<p>I am going to ask you about some situations that happen to some women. Tell me please whether these situations have arisen (occurred) in your relationship with your current or last partner</p> <p>i. Has he pushed or shaken you?</p> <p>ii. Has he hit you with his hand?</p> <p>iii. Has he hit you with an object?</p>	d106	<p>1 = Never 2 = Yes, last year 3 = Yes, before last year</p>	<p>1 = Never 2 = Yes, last year / Yes, before last year</p>
<p>¿Se ha referido (refirió) en términos como: "Ud. no sirve para nada", "Ud. nunca hace nada bien", "Ud. es una bruta" o "Mi mamá me hacía mejor las cosas"?</p>	<p>Has your partner addressed you in terms such as: "You are useless", "You never do anything right", "You are a brute"?</p>	d103c	<p>1 = Never 2 = Yes, last year 3 = Yes, before last year</p>	<p>1 = Never 2 = Yes, last year / Yes, before last year</p>
<p>¿La ha humillado delante de los demás ?</p>	<p>Has your partner humiliated you in front of others?</p>	d103d	<p>1 = Never 2 = Yes, last year 3 = Yes, before last year</p>	<p>1 = Never 2 = Yes, last year / Yes, before last year</p>
<p>¿La ha amenazado (la amenazó) con un cuchillo, arma de fuego u otra arma?</p>	<p>Has he threatened you with a knife, firearm, or other weapon?</p>	d103e	<p>1 = Never 2 = Yes, last year 3 = Yes, before last year</p>	<p>1 = Never 2 = Yes, last year / Yes, before last year</p>
<p>¿La ha acusado (la acusó) de serle infiel?</p>	<p>Has he accused you of being unfaithful?</p>	d101b	<p>1 = Never 2 = Yes, last year 3 = Yes, before last year</p>	<p>1 = Never 2 = Yes, last year / Yes, before last year</p>
<p>¿Le ha impedido (le impidió) encontrarse con sus amiga(o)s?</p>	<p>Has he prevented you from meeting your friends?</p>	d101c	<p>1 = Never 2 = Yes, last year 3 = Yes, before last year</p>	<p>1 = Never 2 = Yes, last year / Yes, before last year</p>
<p>¿Ha insistido (insistió) en saber dónde está (estaba) todo el tiempo?</p>	<p>Has he insisted on knowing where you are all the time?</p>	d101e	<p>1 = Never 2 = Yes, last year 3 = Yes, before last</p>	<p>1 = Never 2 = Yes, last year / Yes, before last</p>

			year	year
¿Alguna persona la ha golpeado, abofeteado o pateado o le ha hecho algo que la haya herido a Ud. físicamente?	Has anyone hit, slapped or kicked you or done something to you that physically hurt you other than your partner?	d115y	1 = Someone physically hurt respondent 2 = None of these people ever physically hurt respondent 3 = No response to question	1 = None of these people ever physically hurt respondent / No response to the question 2 = Someone physically hurt respondent
¿Alguien la ha golpeado, abofeteado, pateado o herido a Ud. cuando estaba embarazada (en cualquiera de sus embarazos)?	Has anyone hit, slapped, kicked or hurt you when you were pregnant (in any of your pregnancies)?	d118y	1 = Someone hurt respondent during pregnancy 2 = No one hurt respondent during pregnancy	1 = No one hurt respondent 2 = Someone hurt respondent
¿Alguna persona se ha dirigido a Ud. en términos como: "Ud. no sirve para nada", "Ud. nunca hace nada bien", "Ud. es una bruta"?	Has anyone every addressed you in terms such as: "You are useless", "You never do anything right", "You are a brute"?	s1239	1 = No 2 = Yes	1 = No 2 = Yes
¿Alguna vez se ha sentido incómoda o morboseada en la calle?	Have you ever felt uncomfortable or unsafe in the street?	s1257	1 = No 2 = Yes	1 = No 2 = Yes
¿Alguna vez la han tocado o manoseado sin que Ud. quisiera?	Have you even been touched or fondled without you wanting it?	s1259	1 = No 2 = Yes	1 = No 2 = Yes

Appendix 7. Example of step-by-step variable removal for Bodily Integrity

1. First, removing variables according to percentage of missing data. Table 1 shows summary statistics for variable long list. Those highlighted in blue are those with a percentage of missing data greater than 10% of the sample size. These were removed in the first round.
2. Second, I assessed skew and kurtosis. Variables were identified with a high skew (>4.0) and kurtosis (>6.5) highlight in green in Table 1. These were not removed at this stage, but retained for polychoric matrix analysis.

Table 1. Summary statistics for bodily integrity variables

	vars	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis	se
d101b	3	7225	1.26	0.44	1	1.2	0	1	2	1	1.1	-0.79	0.01
d101c	4	7225	1.19	0.4	1	1.12	0	1	2	1	1.54	0.38	0
d101d	5	7225	1.09	0.28	1	1	0	1	2	1	2.92	6.54	0
d101e	6	7225	1.24	0.43	1	1.18	0	1	2	1	1.21	-0.53	0.01
d103c	7	7225	1.18	0.38	1	1.1	0	1	2	1	1.66	0.76	0
d103d	8	7225	1.12	0.33	1	1.03	0	1	2	1	2.33	3.43	0
d103e	9	7225	1.14	0.34	1	1.04	0	1	2	1	2.13	2.52	0
d105a	10	7225	1.24	0.43	1	1.17	0	1	2	1	1.24	-0.47	0.01
d105b	11	7225	1.17	0.38	1	1.09	0	1	2	1	1.73	0.99	0
d105c	12	7225	1.04	0.19	1	1	0	1	2	1	4.87	21.69	0
d105d	13	7225	1.05	0.23	1	1	0	1	2	1	3.92	13.39	0
d105e	14	7225	1.03	0.17	1	1	0	1	2	1	5.71	30.61	0
d105f	15	7225	1.04	0.21	1	1	0	1	2	1	4.42	17.55	0
d105g	16	7225	1.01	0.12	1	1	0	1	2	1	8.07	63.16	0
d105h	17	7225	1.04	0.2	1	1	0	1	2	1	4.54	18.65	0
d106	18	7225	1.27	0.44	1	1.21	0	1	2	1	1.05	-0.9	0.01
d107	19	7225	1.09	0.28	1	1	0	1	2	1	2.9	6.38	0
d108	20	7225	1.04	0.2	1	1	0	1	2	1	4.54	18.65	0
d110a*	21	1995	1.44	0.5	1	1.43	0	1	2	1	0.24	-1.94	0.01
d110d*	22	1995	1.08	0.27	1	1	0	1	2	1	3.11	7.7	0.01
d110e*	23	1995	1.21	0.41	1	1.14	0	1	3	2	1.43	0.11	0.01
d110f*	24	1995	1.02	0.13	1	1	0	1	2	1	7.34	51.96	0
d110g*	25	1995	1.01	0.09	1	1	0	1	2	1	11.02	119.57	0
d110h*	26	4451	1.08	0.28	1	1	0	1	3	2	3.02	7.29	0
d115y	27	7225	1.1	0.3	1	1	0	1	2	1	2.64	4.95	0
d118y	28	7225	1.08	0.27	1	1	0	1	2	1	3.19	8.17	0
d124	29	7225	1.05	0.21	1	1	0	1	2	1	4.36	17	0
s1235	30	7225	1.04	0.2	1	1	0	1	2	1	4.52	18.42	0
s1237	31	7225	1.02	0.13	1	1	0	1	2	1	7.37	52.34	0
s1239	32	7225	1.1	0.3	1	1	0	1	2	1	2.63	4.94	0
s1243	33	7225	1.05	0.21	1	1	0	1	2	1	4.37	17.14	0
s1254	34	7225	1	0.05	1	1	0	1	2	1	20.54	419.89	0
s1257	35	7225	1.15	0.36	1	1.06	0	1	2	1	1.94	1.78	0
s1259	36	7225	1.46	0.5	1	1.45	0	1	2	1	0.17	-1.97	0.01

N.B. Variables highlighted in yellow are the final selection.

3. Polychoric correlation matrix. Next, a correlation matrix was run, including the variables identified with high skew and kurtosis. Variables highly correlated (correlation > 0.7) are highlighted in red.

	d101b	d101c	d101d	d101e	d103c	d103d	d103e	d105a	d105b	d105c	d105d
d101b	1	0.6830016	0.5896324	0.66747707	0.6192	0.5635563	0.5823192	0.6290736	0.57545722	0.4200262	0.493605
d101c	0.6830016	1	0.71210067	0.73762593	0.5556221	0.5060965	0.5510107	0.59132733	0.53867434	0.4003339	0.47806
d101d	0.5896324	0.7121007	1	0.64065453	0.6005853	0.5001214	0.5627672	0.56450603	0.5119342	0.4425178	0.504942
d101e	0.66747707	0.7376259	0.64065453	1	0.4866686	0.446297	0.4850458	0.5544541	0.47640084	0.3406004	0.410715
d103c	0.61919999	0.5556221	0.60058533	0.48666858	1	0.7157214	0.6582867	0.69928021	0.66580274	0.5415611	0.654913
d103d	0.56355629	0.5060965	0.50012141	0.44629699	0.7157214	1	0.6511225	0.63822398	0.60490266	0.4932918	0.605745
d103e	0.58231917	0.5510107	0.56276718	0.48504582	0.6582867	0.6511225	1	0.65673967	0.60137099	0.4576097	0.548868
d105a	0.6290736	0.5913273	0.56450603	0.5544541	0.6992802	0.638224	0.6567397	1	0.87961477	0.6292953	0.780858
d105b	0.57545722	0.5386743	0.5119342	0.47640084	0.6658027	0.6049027	0.601371	0.87961477	1	0.6763725	0.830812
d105c	0.42002621	0.4003339	0.44251781	0.34060042	0.5415611	0.4932918	0.4576097	0.6292953	0.67637245	1	0.678476
d105d	0.49360457	0.4780602	0.50494159	0.4107154	0.6549133	0.6057449	0.5488676	0.78085809	0.83081193	0.6784759	1
d105e	0.52880648	0.5198062	0.54094453	0.44097839	0.6698798	0.5406953	0.5606943	0.7689185	0.76370473	0.5540851	0.761682
d105f	0.51458821	0.5089754	0.55108073	0.46781194	0.6400638	0.5520617	0.5815663	0.731337	0.70959775	0.6278379	0.712782
d105g	0.49758509	0.4953537	0.46348585	0.41659521	0.6007627	0.5222572	0.5299144	0.73557293	0.71725646	0.6131742	0.726081
d105h	0.54049384	0.5440006	0.5138687	0.48105489	0.5944351	0.5098031	0.4941341	0.63013364	0.6008092	0.5172977	0.586798
d106	0.61335208	0.5743949	0.53551174	0.5283439	0.6901204	0.6377447	0.668892	0.96440348	0.95668232	0.7236423	0.830991
d107	0.52535908	0.5012832	0.53278698	0.43555722	0.6588077	0.5788499	0.5629783	0.77241902	0.78625939	0.6667624	0.884013
d108	0.54049384	0.5440006	0.5138687	0.48105489	0.5944351	0.5098031	0.4941341	0.63013364	0.6008092	0.5172977	0.586798
d115y	0.1543322	0.2243658	0.17467039	0.21445336	0.2183137	0.254943	0.2138493	0.26061982	0.1933967	0.2238544	0.244308
d118y	0.33941962	0.3458707	0.34533128	0.29210597	0.4106265	0.3961848	0.3878372	0.46009499	0.47274446	0.3959238	0.545542
d124	0.16678493	0.1568881	0.17202235	0.09761592	0.2403056	0.2677438	0.1497769	0.22151111	0.18641459	0.1528092	0.193264
s1235	0.07616366	0.1851294	0.1316016	0.19523606	0.1423572	0.1832089	0.1636162	0.14897534	0.02650782	0.1164261	0.050016
s1237	0.07987114	0.1291883	0.17752591	0.10501546	0.1209592	0.1571222	0.1012022	0.09629216	0.08363611	0.0339591	0.081741
s1239	0.21368964	0.2201511	0.26011354	0.23889047	0.2871107	0.2952316	0.3031558	0.28762694	0.23598145	0.2192192	0.224258

s1243	0.16945728	0.1592925	0.17372053	0.09993683	0.2388112	0.2652089	0.1518347	0.22020225	0.18836834	0.1529197	0.194681
s1254	0.17210137	0.176188	0.07119076	0.1156447	0.1909491	0.18177	0.2351217	0.25570327	0.17003178	-0.431794	0.12013
s1257	0.23187741	0.2516164	0.22314039	0.20070649	0.2358228	0.2716723	0.2646214	0.27583059	0.21968335	0.1490339	0.166514
s1259	0.22266178	0.2110389	0.20111465	0.29909352	0.1942413	0.1663365	0.2180778	0.23751881	0.13085498	0.0797208	0.079013

	d105e	d105f	d105g	d105h	d106	d107	d108	d115y	d118y	d124	s1235
d101b	0.5288065	0.5145882	0.49758509	0.5404938	0.61335208	0.5253591	0.5404938	0.1543322	0.3394196	0.1667849	0.076164
d101c	0.5198062	0.5089754	0.49535374	0.5440006	0.57439486	0.5012832	0.5440006	0.2243658	0.3458707	0.1568881	0.185129
d101d	0.5409445	0.5510807	0.46348585	0.5138687	0.53551174	0.532787	0.5138687	0.1746704	0.3453313	0.1720224	0.131602
d101e	0.4409784	0.4678119	0.41659521	0.4810549	0.5283439	0.4355572	0.4810549	0.2144534	0.292106	0.0976159	0.195236
d103c	0.6698798	0.6400638	0.60076271	0.5944351	0.69012043	0.6588077	0.5944351	0.2183137	0.4106265	0.2403056	0.142357
d103d	0.5406953	0.5520617	0.52225722	0.5098031	0.63774469	0.5788499	0.5098031	0.254943	0.3961848	0.2677438	0.183209
d103e	0.5606943	0.5815663	0.52991443	0.4941341	0.668892	0.5629783	0.4941341	0.2138493	0.3878372	0.1497769	0.163616
d105a	0.7689185	0.731337	0.73557293	0.6301336	0.96440348	0.772419	0.6301336	0.2606198	0.460095	0.2215111	0.148975
d105b	0.7637047	0.7095977	0.71725646	0.6008092	0.95668232	0.7862594	0.6008092	0.1933967	0.4727445	0.1864146	0.026508
d105c	0.5540851	0.6278379	0.6131742	0.5172977	0.72364228	0.6667624	0.5172977	0.2238544	0.3959238	0.1528092	0.116426
d105d	0.7616823	0.7127819	0.7260809	0.5867982	0.83099112	0.8840132	0.5867982	0.2443076	0.5455417	0.1932644	0.050016
d105e	1	0.7106247	0.66767543	0.5865238	0.7838108	0.8755294	0.5865238	0.1946296	0.5007602	0.2218587	0.119228
d105f	0.7106247	1	0.87474479	0.5936006	0.74251474	0.9019323	0.5936006	0.2306579	0.5049507	0.2326574	0.146524
d105g	0.6676754	0.8747448	1	0.5909009	0.78558732	0.8813684	0.5909009	0.1950702	0.510507	0.1802259	0.185546
d105h	0.5865238	0.5936006	0.59090086	1	0.64522929	0.5970116	0.9999591	0.229706	0.4336448	0.2949396	0.160775
d106	0.7838108	0.7425147	0.78558732	0.6452293	1	0.8124573	0.6452293	0.2363656	0.4847957	0.2204845	0.126239
d107	0.8755294	0.9019323	0.88136843	0.5970116	0.81245733	1	0.5970116	0.227505	0.5156428	0.2144337	0.11963
d108	0.5865238	0.5936006	0.59090086	0.9999591	0.64522929	0.5970116	1	0.229706	0.4336448	0.2949396	0.160775
d115y	0.1946296	0.2306579	0.19507022	0.229706	0.23636562	0.227505	0.229706	1	0.5089589	0.5370899	0.600782
d118y	0.5007602	0.5049507	0.51050703	0.4336448	0.48479567	0.5156428	0.4336448	0.5089589	1	0.4363154	0.363166
d124	0.2218587	0.2326574	0.18022589	0.2949396	0.22048447	0.2144337	0.2949396	0.5370899	0.4363154	1	0.409227

s1235	0.1192282	0.1465242	0.18554607	0.1607746	0.12623906	0.11963	0.1607746	0.6007823	0.3631659	0.409227	1
s1237	0.1602758	0.1197833	0.01011366	0.1912081	0.07087703	0.104531	0.1912081	0.6095636	0.4083827	0.456884	0.773957
s1239	0.2184593	0.2265464	0.22311063	0.2697086	0.28560891	0.2160664	0.2697086	0.7196535	0.4561951	0.4533534	0.594756
s1243	0.2231776	0.2342745	0.18141781	0.2886566	0.22092232	0.2164663	0.2886566	0.5392398	0.4385033	0.999854	0.410827
s1254	0.2668028	0.2008643	0.25493416	0.2740137	0.18328435	0.1883769	0.2740137	0.1707166	0.3409274	0.4074832	0.152932
s1257	0.2628098	0.2117076	0.1991187	0.2968128	0.27802878	0.2016661	0.2968128	0.4181773	0.3231012	0.6409483	0.339109
s1259	0.1487204	0.1162941	0.05682566	0.1735794	0.18225835	0.1018086	0.1735794	0.3377656	0.1793511	0.2609664	0.36652

	s1237	s1239	s1243	s1254	s1257	s1259
d101b	0.07987114	0.2136896	0.16945728	0.17210137	0.2318774	0.22266178
d101c	0.12918831	0.2201511	0.15929249	0.17618799	0.2516164	0.21103889
d101d	0.17752591	0.2601135	0.17372053	0.07119076	0.2231404	0.20111465
d101e	0.10501546	0.2388905	0.09993683	0.1156447	0.2007065	0.29909352
d103c	0.12095923	0.2871107	0.23881123	0.19094907	0.2358228	0.19424133
d103d	0.15712216	0.2952316	0.26520892	0.18176998	0.2716723	0.16633651
d103e	0.10120218	0.3031558	0.1518347	0.2351217	0.2646214	0.21807783
d105a	0.09629216	0.2876269	0.22020225	0.25570327	0.2758306	0.23751881
d105b	0.08363611	0.2359815	0.18836834	0.17003178	0.2196834	0.13085498
d105c	0.03395905	0.2192192	0.1529197	-0.4317944	0.1490339	0.07972077
d105d	0.0817407	0.2242581	0.1946807	0.12012957	0.1665144	0.07901256
d105e	0.16027578	0.2184593	0.22317762	0.26680277	0.2628098	0.14872041
d105f	0.11978328	0.2265464	0.23427447	0.20086435	0.2117076	0.11629409
d105g	0.01011366	0.2231106	0.18141781	0.25493416	0.1991187	0.05682566
d105h	0.19120813	0.2697086	0.28865664	0.27401366	0.2968128	0.17357943
d106	0.07087703	0.2856089	0.22092232	0.18328435	0.2780288	0.18225835
d107	0.10453103	0.2160664	0.2164663	0.18837688	0.2016661	0.1018086
d108	0.19120813	0.2697086	0.28865664	0.27401366	0.2968128	0.17357943

d115y	0.60956365	0.7196535	0.53923977	0.17071662	0.4181773	0.33776563
d118y	0.40838272	0.4561951	0.4385033	0.34092737	0.3231012	0.17935107
d124	0.45688399	0.4533534	0.99985401	0.40748316	0.6409483	0.26096635
s1235	0.77395664	0.5947563	0.41082674	0.15293216	0.3391085	0.36651962
s1237	1	0.5747682	0.45804853	0.1855273	0.2935534	0.31133004
s1239	0.57476815	1	0.45550497	0.20659701	0.416936	0.36961197
s1243	0.45804853	0.455505	1	0.40736491	0.6439987	0.25816781
s1254	0.1855273	0.206597	0.40736491	1	0.3977594	0.11585195
s1257	0.29355337	0.416936	0.64399873	0.39775942	1	0.5038717
s1259	0.31133004	0.369612	0.25816781	0.11585195	0.5038717	1

The variable group d105 have been identified with high skew and kurtosis. They are also highly correlated with each other. These variables are also highly correlated with d106 and d107. Before we remove these variables, let's take a closer look at the types of questions behind the codes:

Table 2

d105a	Has he hit you with his hand?
d105b	Have they pushed or shaken you?
d105c	Have they hit you with an object?
d105d	Have they kicked or dragged you?
d105e	Have they tried to strangle or burn you?
d105f	Have they attacked you with knife, firearm or other weapon?
d105g	Threatened with knife/firearm
d105h	Sexually assaulted by partner

Looking at the questions behind the codes in Table 2 shows that the d105 group asks about specific physical violent events. The DHS then combines those that are considered less severe (hit with hand, hit with object, pushed or shaken, kicked or dragged – highlighted in light green) under a new variable code d106, and those more severe (threatened or attacked with weapon, burned or strangled, sexually assaulted – highlighted in dark green) under the new variable code d107 (Friedemann-Sanchez & Lovaton, 2012). Therefore, it would appear sensible to remove the d105 group in favour for retaining d106 and d107. There are high correlations between the d101 group. As d101d was the variable most highly skewed of the group, it was decided to remove this variable. Variables: d124, d108, s1235, s1237, s1243, s1254 were removed due to high skew and kurtosis.