

NOTES FROM THE FIELD

Gender Equality and Armed Conflict: A Critique of Total Fertility Rate as an Indicator

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(Received 30 December 2024; accepted 02 January 2025)

Keywords: gender equality; armed conflict; women's rights; reproductive justice; measurement

Over the past quarter-century, the literature on gender, peace, and security has evolved into a substantial interdisciplinary field. In this line of work, researchers have investigated the interplay between state security and women's security, or how gender equality at the state level affects the occurrence of international and intranational conflict. The conclusion is that more gender-equal countries are less prone to engage in warfare, pointing toward a link between women's security and national security. Various indicators have been used to capture gender equality in this literature, such as the representation of women in parliamentary roles, the proportion of women participating in the labor force, and school enrollment among girls relative to boys.

Some studies have relied on the total fertility rate (TFR), positing that in more gender-equal countries, women give birth to fewer children, which consequently reduces the TFR (Bjarnegård and Melander 2011, 2013; Caprioli 2000, 2003, 2004, 2005; Caprioli and Boyer 2001; Caprioli and Douglass 2008; Dahlum and Wig 2020; Demeritt, Nichols, and Kelly 2014; Forsberg and Olsson 2021; Gizelis 2009; Harris and Milton 2016; Hudson et al. 2009; Hudson and Hodgson 2022; Koch and Fulton 2011; Melander 2005; Omelicheva and Carter 2024; Regan and Paskeviciute 2003; Saiya, Zaihra, and Fidler 2017; Schaftenaar 2017). From a demographic and reproductive justice perspective, however, the TFR has several key weaknesses as an operationalization of gender equality in research on women, peace, and security. In this note, I critically evaluate the TFR as a suitable measurement for

proxying domestic gender equality in political research. First, I argue that the TFR is often misinterpreted. Second, I review the evidence showing its curvilinear relationship with domestic gender equality and mutually co-constitutive relationship with armed conflict. Third, and most crucially, I contend that the distinction between observed, desired, and intended fertility makes the TFR a poor operationalization for women's reproductive agency. I conclude by outlining other indicators readily available by country and year that better represent domestic gender equality than the TFR.

The Total Fertility Rate as an Indicator of Gender Equality

Since the mid-1990s, gender equality has become a core aspect of the sustainable development agenda, deeply embedded in international policy related to population, development, peacebuilding, and conflict resolution (Finkle and McIntosh 2002; Tryggestad 2009). However, gender and gender equality are elusive concepts, carrying different meanings in different contexts. Gender can be viewed as a noun (identity), a verb (action), and a logic that is both a product and productive of performances of violence and security (Butler 1990; Sjoberg, Kadera, and Thies 2018). The term "gender equality" is often used interchangeably with "women's rights," "empowerment," "autonomy," "freedom," "agency," and "self-determination." These terminologies are frequently employed to identify gendered power relations and structures that stratify access to power, aiming to transform heteropatriarchal gender orders that subordinate women to men (Arat 2015; Sardenberg 2016). As the term "gender" puts into question what characteristics women or men share as a group (Young 1994), feminist International Relations (IR) has more recently begun to shift away from a binary perspective of (cis) women/(cis)men and biological sex/social gender, increasingly embracing more comprehensive and pluralistic terminologies (Sjoberg, Kadera, and Thies 2018).

The literature employing the TFR to operationalize domestic gender equality focuses on activities of human reproduction as central to women's role in society. The first study conceptualizing the fertility rate as a proxy for women's status argued:

"[F]ertility rate encompasses a broad range of concepts including level of education, available economic opportunities, political rights, and overall social status. As such, fertility rates best measure a woman's overall status by capturing not only an aspect of education, but also a measure of self-empowerment through control over her own life" (Caprioli 2000, 62).

This conceptualization has since become popularized in the field of gender and conflict. Authors of at least a dozen studies have argued that the TFR represents a plethora of factors, including gender discrimination, reproductive rights, women's health, decision-making, self-empowerment, educational attainment, and labor market participation (Caprioli 2003, 2004, 2005, 2009; Caprioli and Douglass 2008; Cohen and Karim 2022; Forsberg and Olsson 2016; Gizelis 2009; Omelicheva and Carter 2024; Regan and Paskeviciute 2003; Reid 2021;

Schaftenaar 2017). However, I argue that these interpretations present a construct validity issue by misrepresenting what is truly captured by the TFR.

Multiple Definitions of the TFR

Demographers use the TFR to analyze trends in fertility at the macro level. Although often casually interpreted as the “number of births per woman” in a given society, the calculation of TFR is more complex. There are actually two different measures of TFR, commonly conflated in the literature: the *period* TFR and the *cohort* TFR.

The *period* TFR is calculated cross-sectionally by summarizing the age-specific fertility rates of all women within the entire reproductive age range (typically defined as ages 15–49). In other words, it is a snapshot of birth rates in a given year. This measure is sensitive to shifts in the timing of fertility, such as if people are having children at a later age. The *cohort* TFR measures the number of live births women have on average over the entire reproductive life course, but requires completed cohorts, which means that this measure can only be calculated once a group of people born in the same year reaches a certain age (typically age 49). Consequently, the *period* TFR can substantially differ from the *cohort* TFR. For example, if women are only postponing births to older ages but not having fewer births compared to previous generations, the period TFR will decrease, but the cohort TFR will remain the same (Sobotka and Lutz 2010).

Despite this disparity, the period TFR is often used as a synthetic cohort measure to avoid dependence on completed cohorts, including when used as a proxy for gender equality in international studies. The difference between the period and cohort TFRs, along with related demographic measurements, has been extensively discussed in demographic research (Bongaarts and Feeney 1998; Bongaarts and Sobotka 2012; Goldstein and Cassidy 2014, 2016; Goldstein, Sobotka, and Jasilioniene 2009; Myrskylä, Goldstein, and Cheng 2013; Ní Bhrolcháin 1992; Rodríguez 2008; Schoen 2004; Sobotka and Lutz 2010). The misunderstanding of what the TFR represents leads to misguided uses of it (Sobotka and Lutz 2010), for example, in gender and political research.

The Curvilinear Relationship between Gender Equality and the TFR

Operationalizing gender equality as period TFR assumes a linear relationship between the two at the macro level, but a sizable body of demographic and sociological research suggests a curvilinear relationship. According to this literature, macro-level fertility patterns can be explained by women’s roles in society in combination with the degree of institutional or partnership support (Arpino, Esping-Andersen, and Pessin 2015; Chesnais 1996; Esping-Andersen and Billari 2015; Goldscheider, Bernhardt, and Lappegard 2015; Hochschild and Machung 1997; Kalwij 2010; Kan 2023; Kolk 2019; McDonald 2000a, 2000b, 2013; Mencarini and Sironi 2012; Mills 2010; Neyer and Andersson 2008; Neyer, Lappegård, and Vignoli 2013; Sevilla-Sanz 2010; Teitelbaum 2018). This pattern is illustrated in Figure 1, expanding on Esping-Andersen and Billari (2015).

At point A, in countries with a prevailing male breadwinner/female caregiver gender order, the TFR is generally high. At point B, among countries with slightly more gender equality, women increasingly participate in labor markets and other public spheres. However, men have not entered the domestic sphere to the same extent due to engrained gender norms, leaving women to perform an additional unpaid “second shift,” particularly in settings lacking public childcare. This dual burden compels many women to postpone or entirely forego child-bearing in favor of economic independence. Consequently, the TFR decreases. These are factors typically used to explain very low fertility rates in countries such as South Korea and Ukraine, where many people express a desire for more children than they actually have (Teitelbaum 2018). Rather than representing gender equality, this situation can be attributed to work-family conflict and slow-paced changes in the gendered division of labor.

At point C, countries with the highest levels of gender equality also exhibit the highest female employment rates globally — and slightly higher fertility rates. This has been attributed to the advancement of men’s involvement in childcare and family-friendly policies such as government-subsidized childcare, extensive parental leave, and other institutional support that help mitigate the work-family conflict. The Nordic states are usually discussed as representatives of this end of the spectrum.

The pattern depicted in Figure 1 highlights that TFR mirrors levels of gender equality only at points A and C, but not when considering point B. The curvilinear relationship between gender equality and the TFR makes the latter a statistically inappropriate continuous indicator to represent gender equality, at least without including a squared term. Nevertheless, other issues also make the TFR an unsuitable proxy for gender equality.

Issues of Reverse Causality

Existing research suggests a mutually co-constitutive relationship between women’s status, reproductive autonomy, and armed conflict. On one side, evidence

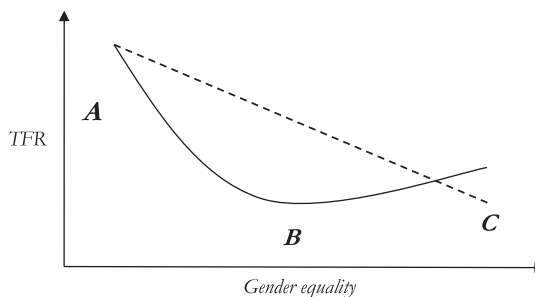


Figure 1. The total fertility rate and gender equality.

Notes: The solid line represents the curvilinear relationship between the total fertility rate (TFR) and gender equality demonstrated in demographic and sociological research. The dashed line illustrates the linear relationship between TFR and gender equality that is assumed in prior studies on the link between women’s security and state security.

suggests that gender-based violence — often understood as the pinnacle of heteropatriarchal gender orders — leads to escalations of battle violence (Nagel 2021). On the other side, studies have shown that when women have control over their reproductive choices, the population pyramid shifts in a way that promotes peace (Hudson and den Boer 2002; Pinker 2012; Urdal 2006).

Looking more closely at the relationship between conflict and fertility, prior research presents mixed evidence regarding its direction. Studies reporting a *positive* fertility response to conflict offer various explanations, such as elevated mortality and reduced health care access (Castro Torres and Urdinola 2018), child loss and replacement effects (Kraehnert et al. 2019; Torrisi 2020; also, Jayaraman, Gebreselassie, and Chandrasekhar 2009), and limited reproductive autonomy (Verwimp, Osti, and Østby 2020). Conversely, other research notes a *negative* relationship between armed conflict and fertility, often attributed to postponements of marriage and spousal separation (Blanc 2004; Clifford, Falkingham, and Hinde 2010; Khat, Deeb, and Courbage 1997; Thiede et al. 2020; Woldemicael 2010). Some studies report both negative (mostly short-term) and positive (mostly long-term) effects of conflict on childbearing within the same context, sometimes varying by population subgroups (Agadjanian and Prata 2002; Cetorelli 2014; Lindstrom and Berhanu 1999; Van Bavel and Reher 2013). Given these reverse causality concerns, the TFR is a dubious operationalization of domestic gender equality because armed conflict can also affect childbearing.

New Perspectives on Reproductive Health, Rights, and Justice

Where does the focus on the TFR come from? Until the mid-1990s, decennial population conferences hosted by the United Nations brought together policy-makers and researchers to discuss widely held Neo-Malthusian perceptions that families in poor countries were having too many children, believed to cause imminent exponential and unsustainable population growth, as captured by the term “the Population Bomb.” A paradigm shift came with the International Conference on Population and Development in Cairo in 1994, when representatives of non-governmental women’s grassroots organizations called for a stop to the obsession with contraception programs to reduce the TFR in low- and middle-income countries. The Cairo Program instead emphasized women’s rights to bodily autonomy and to determine their family size, popularizing a rights-based framework focused on sexual and reproductive health and rights (SRHR) (Finkle and McIntosh 2002). More recently, scholars and activists have increasingly used the intersectional concept of reproductive justice, underscoring that bodily choice alone is insufficient to achieve SRHR for all because many people lack access to even basic services that would enable them to exercise such choices (Ross and Solinger 2017).

These conceptual advances highlight shortcomings in using the TFR as a measure of gender equality. More specifically, the TFR does not capture women’s ability to realize their fertility preferences, nor whether childbearing was desired and intended. As a measure, it assumes that women have full contraceptive autonomy and no infertility (Goldstein and Cassidy 2016; Senderowicz

2020). This is rarely the case, as infertility and barriers to women's access to reproductive health care exist in all contexts. When the desired fertility size fluctuates, the TFR fluctuates even more; the TFR is larger than the desired family size when the latter is increasing, and smaller when the desired family size is decreasing (Goldstein and Cassidy 2016).

A narrow focus on the TFR, moreover, perpetuates Neo-Malthusian concerns and may lead to policy solutions more focused on population control than on reproductive health, rights, and justice. Such logic has been used to motivate, for example, forced contraceptive programs, based on colonial and eugenic ideas about who is fit to have children, and that lower fertility equates to higher development (Roberts 1998; Senderowicz 2019, 2020; Senderowicz et al. 2023; Senderowicz and Kolenda 2022; Taylor 2020). Moreover, interpreting the TFR as gender equality might lead to the belief that reducing fertility will improve women's status in society. But cases of state reproductive governance, such as the "One Child" policy in China, show that this approach can cause considerable oppression of women's reproductive autonomy (Chen and Summerfield 2007; Greenhalgh 1994).

Women may genuinely desire large families and carry on having many children. From a reproductive justice perspective, using high parity progression (i.e., having more children) to capture low gender equality is paternalistic and fails to capture women's fertility goals, and to what extent they can achieve them (Roberts 1998; Senderowicz et al. 2023). Women may have a lot of children because it aligns with their chosen way of living. Alternatively, they may not be able to bear children although they wish to have them. Neither scenario implies that the number of children a woman has indicates her ability to enjoy reproductive autonomy. Consequently, the TFR is an inappropriate measure of reproductive autonomy and justice.

Alternatives for Measuring National Gender Equality

Given the limitations of the TFR as a useful indicator for domestic gender equality, what other dimensions of women's status in a society should we consider? And how do we measure them? These questions link back to the initial discussion about what gender equality truly is, a key debate within research on gender and conflict (Butler 1990; Sjoberg, Kadera, and Thies 2018).

There is no silver bullet for measuring gender equality; all measures have distinct strengths and limitations. Yet there are better options available that outperform the TFR in both construct validity and theoretical relevance. Table 1 lists these alternatives, providing their definitions and relative strengths and weaknesses as indicators of gender equality at the national level. These indicators, which are easily accessible via online sources and readily available by country and year, offer abundant alternatives for researchers to choose from depending on the focus of their study.

These measures, of course, also have their advantages and disadvantages when trying to capture measures of gender equality. For example, the absolute number of births is a more accurate measure of current fertility. However, this

Table 1. Macro-level indicators of gender equality

Indicator	Technical definition	Strengths	Weaknesses
Total fertility rate (TFR)	The sum of age-specific fertility rates over the entire age range in a given year		<ul style="list-style-type: none"> - Frequently misunderstood - Sensitive to fertility postponement - Non-linear relationship with gender equality - May be affected by conflict (reverse causality) - No distinction between observed, desired, and intended fertility - Disregards reproductive autonomy
Number of births	Absolute number of births	<ul style="list-style-type: none"> - Not sensitive to fertility postponement 	<ul style="list-style-type: none"> - Sensitive to compositional changes in population - May be affected by conflict (reverse causality)
Women's labor market participation	Proportion of women in labor force	<ul style="list-style-type: none"> - Captures women's economic activity 	<ul style="list-style-type: none"> - Ignores unpaid and informal work - May be affected by conflict (reverse causality)
Women's schooling	School enrollment among girls relative to boys	<ul style="list-style-type: none"> - Captures women's human resource development and social class 	<ul style="list-style-type: none"> - May be affected by conflict (reverse causality)
Women's political participation	Share of women in parliament	<ul style="list-style-type: none"> - Captures women's political activity 	<ul style="list-style-type: none"> - Disregards the share of women in population - May be affected by conflict (reverse causality)
Unintended pregnancy rate (UPR)	The number of women aged 15–49 years wishing to avoid pregnancy	<ul style="list-style-type: none"> - Captures women's ability to realize fertility intentions 	<ul style="list-style-type: none"> - Likely underreported - Unclear who should be counted in the denominator - May be affected by conflict (reverse causality)
Unmet need for family planning	The percentage of women who do not want to become pregnant but are not using contraception		<ul style="list-style-type: none"> - Disregards women's preferences - No distinction between supply and demand - Relies on a binary metric of fertility intentions - Uses marriage as a proxy for sexual activity - Excludes unmarried women

(Continued)

Table 1. *Continued*

Indicator	Technical definition	Strengths	Weaknesses
			<ul style="list-style-type: none"> - Excludes users of contraception who are ill-served by their current methods - May be affected by conflict (reverse causality)
Legal status of abortion	The legal status of abortion	<ul style="list-style-type: none"> - Captures whether women can legally terminate a pregnancy 	<ul style="list-style-type: none"> - Disregards access to abortion services
Maternal mortality rate (MMR)	The number of maternal deaths per 100,000 live births	<ul style="list-style-type: none"> - Captures women's health during and after pregnancy and childbirth - Captures women's access to health care 	<ul style="list-style-type: none"> - Disregards whether pregnancy was wanted and planned - May be affected by conflict (reverse causality)
Adolescent fertility rate (AFR)	Births per 1,000 women aged 15–19	<ul style="list-style-type: none"> - Captures girls' (willingness and) ability to postpone childbearing - Captures girls' health risks - Captures girls' ability to complete school 	<ul style="list-style-type: none"> - Implicitly assumes that adolescents would always postpone childbearing if they could - May be affected by conflict (reverse causality)
Gender inequality index (GII)	Composite measure of women's participation in the labor force, educational attainment, representation in parliament, MMR, and AFR	<ul style="list-style-type: none"> - Broadly captures various dimensions of women's status in a society 	<ul style="list-style-type: none"> - A composite measure may obscure important nuances between single indicators - Confusing functional form - Some items are women-specific while others are relative to men - May be affected by conflict (reverse causality)

measure does not consider factors affecting the composition of the population, such as prior fertility postponement, shifting age structures, and outmigration of younger people, all of which can be expected to take place during conflicts. Thus, a lower number of absolute births may be reflective of a changing population, not an increase in gender equality. Other measures frequently used in the literature to operationalize domestic gender equality capture the extent to which women participate in the labor market, education, and parliamentary roles. These measures are certainly relevant to assessing women's access to economic and political resources, although they fall short of considering to what extent women can enjoy reproductive well-being and bodily autonomy (Mills 2010).

Measures related to reproductive health and autonomy offer greater leverage for capturing these aspects of gender equality and inequality. The unintended pregnancy rate estimates the number of women aged 15–49 years wishing to avoid pregnancy annually (Bearak et al. 2023), compensating for the TFR's ignorance of fertility intentions. However, estimates are likely underreported. Women may hesitate to report existing children as unwanted, or they may have ambivalent fertility preferences (Bankole and Westoff 1998; Gipson, Koenig, and Hindin 2008; Mumford et al. 2016; Sennott and Yeatman 2012; Yeatman and Sennott 2015; Yeatman and Smith-Greenaway 2021). Measures of access to abortion and contraception services capture to what extent women can exercise reproductive autonomy (Potter et al. 2019), but degrees of access are difficult to quantify. The unmet need for family planning has long been used as a proxy for access to and desire for contraception, but has been widely criticized for neglecting women's preferences and statistical inaccuracy (Bradley and Casterline 2014; Sedgh, Ashford, and Hussain 2016; Senderowicz et al. 2023; Senderowicz and Maloney 2022). While more direct measures of contraceptive autonomy have been developed and validated at the individual level, such indicators are currently unavailable for all countries or over time (Senderowicz 2020).

The Center for Reproductive Rights records the legal status of abortion in countries and territories across the globe, distinguishing between whether abortion is available on demand, prohibited altogether, or permitted on certain grounds (Center for Reproductive Rights n.d.). However, it disregards the availability, accessibility, and quality of abortion services. The maternal mortality rate (MMR) is useful because it captures women's health during pregnancy and childbirth, an important indicator of whether women can access health care resources. However, it neglects whether those pregnancies and births were wanted and intended. The adolescent fertility rate (AFR) is relevant considering that early childbearing confers health risks for both mothers and infants, and generally hinders educational attainment. However, it is often used to represent the extent to which girls and young women can postpone childbirth, although they may not always want to (Roberts 1998).

Both the MMR and AFR are included in the United Nations Development Program's Gender Inequality Index (GII). The GII was developed to overcome limitations of its forerunners and includes women's participation in the labor force, educational attainment, representation in parliament, the AFR, and the MMR (Seth 2009). The GII has been criticized for its complex functional form that

hinders interpretability and penalizes the performance of low-income countries. Further, it conflates items measured in absolute, women-specific terms with gender gaps relative to men (Permanyer 2013).

Many of these indicators have a co-constitutive relationship with armed conflict, making causal claims difficult and perhaps irrelevant. All measures have limitations, but some, like the TFR, are more problematic than others. Since gender equality is an elusive, multidimensional phenomenon that cannot be captured in one single measurement, using multiple indicators may be the best option for researchers interested in measuring women's status. Above all, researchers must make informed decisions and use the indicators that contribute most to validity.

Conclusions

Researchers of gender and conflict have investigated whether state security is linked to women's security. While sound theoretical and empirical foundations support this claim, the TFR is an unsuitable option for measuring gender equality at the nation-state level. As discussed in this note, this measure is sensitive to postponements in childbearing; exhibits a non-linear relationship with gender equality, and a co-constitutive relationship with armed conflict; and neither distinguishes between observed, desired, and intended fertility, nor captures to what extent women can make autonomous reproductive decisions. Contrary to what past studies have argued, the TFR does *not* measure gender discrimination, reproductive rights, women's health, educational attainment, and labor market participation (Caprioli 2003, 2004, 2005, 2009; Caprioli and Douglass 2008; Cohen and Karim 2022; Forsberg and Olsson 2016; Gizelis 2009; Omelicheva and Carter 2024; Regan and Paskeviciute 2003; Reid 2021; Schaftenaar 2017). Other readily available indicators provide better alternatives to capture both women's reproductive health and their access to public goods such as education, politics, and health care. In conclusion, we can — and should — choose better measurements than the TFR to assess women's status in society, for example, when investigating the relationship between gender equality and armed conflict.

Acknowledgments. I am grateful to Dr. Kelly Hunter, members of the Gender and Gender Inequality Workshop of the Department of Sociology, Stanford University, and participants at the Psychosocial Workshop 2023 in New Orleans and the International Studies Association Annual Meeting 2024 in San Francisco for their insightful comments on earlier versions of this manuscript. Any errors are my own. This research was conducted during a postdoctoral fellowship graciously funded by the Knut & Alice Wallenberg Foundation (grant number 2021.0331). The funder had no role in the design of this work or the decision to publish.

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Cite this article: Svallfors, Signe. 2025. "Gender Equality and Armed Conflict: A Critique of Total Fertility Rate as an Indicator." *Politics & Gender* 1–15. <https://doi.org/10.1017/S1743923X25000029>