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Food Insecurity, Peace and Women

A quantitative study on how female signatories in peace processes affect the likelihood of food (in)security

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Abstract

The correlation between food insecurity and conflict has previously been studied and established in multiple studies. Furthermore, additional research has found linkages allying increased levels of female political participation and the de-escalation of conflict. Despite these facts, there are to date no studies examining whether female inclusion in peace processes has an effect on hunger. Thus, this dissertation addresses the relationship between female signatories' presence in peace processes and food insecurity. Food insecurity is operationalized as prevalence of undernourishment, and female inclusion in peace negotiations is measured by the presence of female signatories in such processes. The study's main conceptual claim is based on gaps found in previous literature, and argues that a higher level of female participants in peace processes leads to a lower level of food insecurity. The claim is evaluated in a quantitative statistical analysis, using data on food insecurity from the *FAOSTAT Data for Food Security Indicators*, and incorporating statistics on female inclusion in peace negotiations from the *Replication Data for Women's Participation in Peace Negotiations and the Durability of Peace*. The analysis illustrates food insecurity's dissemination in post-conflict societies and gender dispersals within peace negotiations, in order to demonstrate an existing correlation. Built on results from an ordinary least squares regression, the study confirms that higher presence of female signatories in peace processes decreases the likelihood of food insecurity in post-conflict societies.

Key words: *peace processes, inclusion, female signatories, gender equality, peace, conflict, peace durability, political stability, food (in)security, post-conflict societies*

Word count: 11,175

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List of Abbreviations and Glossary

CEDAW	The Committee on the Elimination of Discrimination against Women
CFR	Council on Foreign Relations
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
MGDs	Millennium Development Goals
NGO	Non-Governmental Organisation
OLS	Ordinary Least Squares Regression
PoU	Prevalence of Undernourishment
SDGs	Sustainable Development Goals
UCDP	Uppsala Conflict Data Programme
UN	United Nations
UNSCR 1325	United Nations Security Council Resolution 1325
WCSO	Women Civil Society Organizations
WFP	The United Nations World Food Programme
Sida	*Styrelsen för internationellt utvecklingssamarbete (in Swedish)*

1. Introduction

"If you don't have food security, you're not going to have any kind of security", claims David Beasley, the Executive Director of the United Nations' World Food Programme (WFP). Food security can, according to Brinkman & Hendrix (2011: 11) be enhanced when a state of stability is reenforced, which in turn, is dependent on the achievement of peace. The researchers further provide various examples describing where peace has been improved by specifically increased agricultural productivity. Their study finds existing peacebuilding outcomes reached by food security assistance. Brinkman & Hendrix (2011: 13-14) further claim that food insecurity is a "threat multiplier", whose improvements can assist in reducing tensions. WFP additionally argues that "hunger is a weapon of war" (Reynolds, 2020, 7 November). Hence, the correlation between food insecurity and conflict should further be examined in order to find what aspects can promote peace, as peace has been found to be an important contributor to stability, and thus, arguably food security. Krause et al. (2018) have investigated the correlation between women's participation in peace negotiations and the durability of peace. Based on their research, the authors claim that there is a strong relationship between female inclusion and peace (Krause et al., 2018: 3). They further state that women civil society organizations (WCSOs) play a significant role in the implementation of peace (Krause et al., 2018).

WCSO:s are further of significance for rural women and the agricultural labor force. The Committee on the Elimination of Discrimination against Women (CEDAW) was adopted in 1979 by the UN General Assembly, where the general recommendation on article 14 of CEDAW describes the significance of rural women's contributions for global food security (Sida, 2015: 1). Rural women are vital for the development of rural areas by constituting one-fourth of the agricultural labour force and production of food growth. Although rural women's economic empowerment is meaningful in order to secure the well-being of communities, these women are still constituting a high amount of unpaid workforce. Article 14 in CEDAW further claims that rural women's equal access to productive resources would raise agricultural yields and thus, reduce hunger. Therefore, rural women's economic empowerment is of meaningful significance for the establishment of global food security. Hence, one could argue that it is of importance to include these women in political decision-making, such as peace processes (UN General Assembly, 1979).

In 2015, the 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development were adopted by the 193 member states of the United Nations, in

order to promote sustainable global security. The SDGs are built on the previous Millennium Development Goals (MDGs), that were aimed to contribute to e.g., combating poverty, decreasing hunger, and eliminating discrimination against women. Entering 2020, the world also entered the "decade of action" which calls for an acceleration of the SDGs, meaning that we need to work with direct delivery in order to achieve the established goals. This includes e.g., working to decrease poverty, promote peace and justice, abolish inequality, and improve climate change (United Nations, 2020). Although all 17 SGDs are of significance, one could argue that they do affect each other in various ways. Hence, to accelerate the goals as the decade of action requires, the mentioned challenges could, as a suggestion, be improved by narrowing down and focusing on specific goals. This thesis argues that SDG 2, that focuses on ending hunger, achieving food security, improving nutrition and promoting sustainable agriculture, may improve peace, and thus, enhance world standards which contribute to a more sustainable future for all human beings. This dissertation further claims that SDG 2 is directly impacted by SDG 5, that focuses on achieving gender equality and empowering all women and girls.

The explained puzzle above identifies a research gap questioning whether SDG 2 may affect SDG 5, or more precisely, whether female participation in peace processes' effect on peace might contribute to a decrease in food insecurity. Although there is existing research providing evidence on the linkage between female inclusion in peace processes and peace, and reliable findings presenting the correlation between conflict and hunger, no evidence has to date been found linking women's presence in peace processes and food (in)security. Thus, the lack of academic research on this fundamental linkage opens a door for this specific study. The main argument in this thesis is that higher levels of female participants in peace negotiations lead to lower levels of food insecurity. Hence, this thesis aims to answer the research question:

"How do female signatories in peace processes affect food insecurity in post-conflict societies?"

The dissertation will contribute by analyzing peace agreements signed by women in post-conflict societies, and by studying the prevalence of undernourishment in these countries between the years of 2000-2011.

The paper initially provides a presentation of the research problem and aim. Second, it will continue by demonstrating the theoretical framework which introduces previous research

and gap, theory, and the causal mechanism. Third, the research design is outlined, consisting of the choice of methodology, data set, operationalization of the dependent variable, independent variable, and five control variables, as well as the validity and reliability of these variables. Fourth, results and analysis are described, consisting of a bivariate and multivariate regression analysis, discussion and future research, as well as limitations and alternative explanations. Finally, the dissertation will end with a conclusion.

2. Theoretical framework

This section aims to first, define the terminology and central concepts introduced in the thesis. This will be done by analysing previous research and the research gap. Second, the study's theory, causal mechanism and contribution will be presented.

2.1 Terminology and concepts

The Food and Agriculture Organization of the United Nations (FAO) defines food security as "a situation that exists when all people, at all times, have physical, societal and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO et al., 2020: 254). Thus, *food insecurity* appears when the established requirements for food security are *not* met. Previous research shares a consensus about the impenetrable quantitative measurements of food security. However, FAO presents four frameworks for its operationalization. These consist of 1) food availability, 2) food accessibility, 3) food utilization, and 4) stability. This thesis will focus on accessibility in its operationalization and examine data on the prevalence of undernourishment provided by the Food and Agriculture Organization Corporate Statistical Database (FAOSTAT) (Ibid: 254).

The examined population in this dissertation consists of *peace agreements*. The chosen sample and unit of analysis in this study is thus, *peace agreements signed by post-conflict societies*. According to the Cambridge Dictionary (2020), a "society" is a "large group of people who live together in an organized way, making decisions about how to do things and share the work that needs to be done. All the people in a country, or in several similar countries, can be referred to as a society" ("Society", 2020). Hence, a "post-conflict society", is a group of people, as described above, that have experienced conflict. According to the Uppsala Conflict Data Programme (UCDP), a "conflict" can be defined in various ways. UCDP presents four definitions of conflict: an armed conflict, an interstate conflict, an intrastate conflict and an internationalized conflict. In accordance to the replication data set compiled by Krause et al. (2018), this study is using the definition of an armed conflict, which is "a contested incompatibility that concerns government and/or territory where the use of armed force between two parties, of which at least one is the government of a state, results in at least 25 battle-related deaths in one calendar year" (UCDP, n.d.). Thus, the UCDP terminology is characterized by referring to fatalities in order to increase the definitions' reliability. However, it centres political incompatibility as well, which permits UCDP to

identify variation between conflicts at lower levels (Strand & Dahl, 2010: 1). Strand & Dahl (2010) further claim that UCDP's focus on theory-driven definitions enlightens variation between different sorts of organized violence (Ibid: 1). Hence, this dissertation's definition of a post-conflict society is based on both the Cambridge Dictionary and UCDP's terminologies.

This study further focuses on female signatories in peace processes. Thus, a distinction between peace processes and peace agreements needs to be highlighted. A peace process is the procedure consisting of meetings, negotiations and agreements in which actors are involved when they are aiming towards establishing peace between two conflicting groups ("Peace Process", 2020). Furthermore, UCDP defines a peace agreement as "a formal agreement between warring parties which addresses the disputed incompatibility, either by settling all or a part of it, or by clearly outlining a process for how the warring parties plan to regulate the incompatibility" (UCDP, n.d.). As this thesis focuses on female participation in peace processes, the identified scope condition consists of peace agreements involving female signatories in the peace process. Moreover, the Cambridge Dictionary defines 'signatory' as "a person, organization, or country that has signed an agreement" ("Signatory", 2020). This paper aims to focus on female signatories in peace processes. Krause et al. (2018) refers to "female signatories" as "individuals signing agreements who identify themselves as women", a definition that this paper will follow.

2.2. Previous research and gap

2.2.1 Food insecurity

The first defined central concept in this thesis is food insecurity. The concern that conflicts caused by food insecurity will be more recurring in the future has increased over the last years. This apprehension is, according to Rudolfsen (2020), based on the increasing international food prices, which have led to social unrest and have had severe economic effects on the developing countries. The fluctuation in food prices is affected by e.g., changes in the general market, climate change and undermined agricultural trade. These structural changes are of significance and need to be emphasised in order to understand the correlation between political instability and food insecurity. Based on her research, Rudolfsen (2020: 939) further argues that a state of social unrest promotes food insecurity, which in turn can lead to conflict. Thus, the author presents various theoretical mechanisms which urge to explain the linkages between food insecurity and unrest. As one of these focuses on poor economic status on an individual level, the researcher additionally stresses that previous

findings suggest different explanations to why unrest occurs as a consequence of increased levels of food insecurity. Due to lacking research, the causes that expect food insecurity to promote social unrest, have to date not been specified. Hence, Rudolfsen (2020) claims that the linkages between food insecurity and unrest are complex. Increasing food prices might not cause unrest itself, however, contribute to expressed grievances and mobilize an urge for political change (Ibid: 939). The complexity in understanding the causes of food insecurity is further based on the various measurement approaches. Weinberg & Bakker (2015: 310) e.g. argue that measuring food insecurity by examining food prices contribute to more direct operationalisation and presents variation in each country. Rudolfsen (2020) additionally claims that, as food prices focus on the amount spent on food, it does not necessarily enhance the knowledge of fluctuation in food prices' effect on food security itself. Although food prices obstruct food consumption, coping mechanisms on an individual level might secure the access to nourishment (Rudolfsen, 2020: 938). Thus, one could assume that high food prices alone do not extort food insecurity.

Besides the insights from the academic literature, reports from international organizations offer additional comprehension, albeit with limited theoretical discussions. To further help understanding the current effects of food insecurity, the Food and Agriculture Organization of the United Nations (FAO) has issued its annual flagship publication *The State of The World* (2020), which maps the state of food security and nutrition globally. According to the report, approximately 960 million people, which equals 8.9 percent of the world's population, were undernourished in 2019 before the Covid-19 pandemic. Entering the decade of action in 2020, the report proves that despite Agenda 2030's commitments, the work towards ensuring the access to nutritious food and eliminating malnutrition is still not seen to be achieved. FOA's data has been collected using measurements from the prevalence of undernourishment (PoU), which is an operationalization source that, as previously mentioned, this particular thesis will follow. FAO's (2020) operationalizing measurements are split up into four food security dimensions, identified from FAO's definition of food security. The dimensions outline additional central concepts of this study. These concepts consist of, more particularly; 1) food availability; 2) economic and physical access to food; 3) food utilization; and, 4) stability over time. The first dimension concerns actual presence of food, focusing on e.g., food production. The second dimension involves adequate access to the food production. The third dimension focuses on individuals' nutritional status, emphasizing sufficient consumption of nutrition and energy. The fourth dimension strives towards ensuring that the first three mentioned dimensions are secure (FAO, 2020: 254). One

may assume that constant food prices would enhance stability, which further provides a contribution to Rudolfsen's (2020) research. In order to reach dimension 2; economic and physical accessibility, dimension 1; food availability, needs to be present (Ibid: 254). Thus, this thesis takes both availability and accessibility into consideration.

Following the 2030 Agenda, FAO's annual flagship publication suggests to e.g., focus on enhancing the agricultural sectors in order to both promote nutritious food and stabilize the cost fluctuation of such goods (FAO, 2020: 26). As mentioned, the general recommendation on article 14 of CEDAW further states that women's inclusion in decision making is of significance for rural women's economic empowerment. Hence, when these economic needs for equality are met, rural women's equal access to productive resources raise agricultural yields, and thus, decrease hunger, which provides food security within a society (UN General Assembly, 1979). One might therefore hypothesize that an increase in female political participation might enhance stability and decrease food insecurity.

Brinkman & Hendrix (2011) argue that there is a linkage between food insecurity and conflict, and that food security increases the chances of reducing violent conflicts. The authors therefore investigate whether food insecurity causes grievances, and thus, is a threat affecting violent conflict. Furthermore, the researchers examine whether decreasing food insecurity has an effect on political stability (Brinkman & Hendrix, 2011: 1). Looking at post-conflict societies, the authors found that a majority of these had undernourishment implicated as either a consequence or a cause of conflict. They argue that higher levels of food insecurity might promote grievances and lead to various political actions. Protests often build on grievances, and are particularly dependent on variables such as political regimes and weak institutions (Brinkman & Hendrix, 2011: 2). Krause et al. (2018) additionally state that democracy is frequently taken into consideration when protecting human rights, and is thus incorporated in peace processes and peace building (Krause et al., 2018: 9-10). In consideration of the significant effects of democracy on peace, it should as well be assimilated when examining the causes leading to food insecurity.

2.2.2. Female signatories in peace processes

To further examine the identified gap of female participation in peace processes' effects on peace and food security, the linkages between the additional central concepts female inclusion, conflict, and hunger will be presented.

The UN Security Council Resolution 1325 (UNSCR 1325) was adopted in October 2000. It calls for women's equal participation in all stages of the prevention and resolution of conflict, and strengthening women and girls' protection from conflict-related sexual violence. Although i.e., Krause et al., (2018) have analysed previous studies expressing a consensus concerning the fact that women's participation in peace negotiations increases the durability and quality of peace, the call of action promoted by the UNSCR 1325 has still not been met. According to the researchers, the participation gap depends on a lack of research. The authors further stress the significance of additional systematic in depth-research on the acknowledged gap, as female participation in peace negotiations is highly possible to increase the likelihood of women's political inclusion in post-conflict societies (Krause et al., 2018: 1-2). Female inclusion in political decision-making in turn, might, according to the general recommendation on article 14 of CEDAW (1979), benefit women's economic empowerment and the agricultural production, which women dominantly represent. Even though Krause et al. (2018) argue for existing lacking empirical analyses strengthening the fact that women's participation in peace negotiations positively impacts peace durability and gender equality, there still exist contesting theoretical evidence on the topic. O'Reilly et al. (2015) claim that women's participation in peace processes increase the likelihood of reaching a peace agreement, implementing the negotiated settlement, and that there is a linkage between women's socioeconomic status and the likelihood of civil conflict. Following O'Reilly's (2015) research, Krause et al. (2018: 2) examines whether women's participation in peace negotiations have an impact on peace durability. As mentioned, the researcher's statistical analysis found a remarkably low number of peace agreements signed by women. Despite these results, Krause et al. (2018: 3) could identify a strong relationship between female signatories and durable peace. Two meaningful findings present power sharing provisions in negotiated settlements, and the inclusion of civil society representatives as beneficial for the implementation of lasting peace. Krause et al. (2018) therefore claim that a strong connection between female signatories in peace processes and WCSOs play a significant role in the implementation of power sharing, inclusion, and thus, durable peace (Krause et al., 2018: 4-5). Caprioli and Melander (2005) further argue that there is a correlation between gender inequality and civil war onset. Hudson et al. (2012, 2019) additionally highlight the relationship between women's security, women's inclusion in political participation and peace durability (Krause et al., 2018: 6). Hence, one could argue that there is a strong correlation between women's empowerment and peace.

In light of the evidence provided by the findings in previous literature, this analysis

will control for the variables 'power sharing', 'democracy', 'GDP', 'female legislators', and 'leftist ideology' when examining the correlation between female signatories in peace processes and food security.

2.3 Theory

As elaborated, even though previous studies have found a correlation between conflict and food insecurity, and a linkage between female inclusion in peace processes and durable peace, no research studying the relationship between female signatories' presence in peace processes and food (in)security has been found. Thus, the gap of this particular research on the fundamental linkage described above needs to be theoretically examined. The theoretical argument in this dissertation is primary based on Ribot and Peluso's (2003) *Theory of Access*, and Krause et al.'s (2018) theory of *women's participation in peace negotiations enhancing peace durability*. The causal mechanism incorporates two steps; 1) high female participation in peace processes results in peace which enhances political stability; 2) political stability advances food availability, food accessibility and food utilization which promotes nutritional status, and thus, generates a state of food security.

Introducing the first mentioned theory, Mutea et al. (2020), present research which shows that food insecurity specifically depends on the lack of accessibility to farm technology. Farm technology is crucial in order to utilize further agricultural resources. The authors base their research on the theory of access, where accessibility is defined as "the ability to derive benefit from things" (Ribot & Peluso, 2009: 164). "Things" in this context, bring focus to natural resources, such as nourishment. Theorizing accessibility, the researchers further investigate mechanisms and processes that influence people's social security in relation to natural assets (Ribot & Peluso, 2009: 154). Moreover, Mutea et al. (2020: 11) apply Ribot & Peluso's (2009) theory of access to merely food security. The authors additionally introduce the required research gap of understanding what elements impact the accessibility to the resources necessitous for food security. Hence, the researchers suggest investigating the gender aspect's impact on the mechanisms utilized for natural resources, i.e., nourishment accessibility.

Examining the second mentioned theory, Krause et al.'s (2018) contribution of women's participation in peace processes and its effect on peace durability, one can interpret that peace is more frequently occurring in societies with higher levels of gender equal inclusion. Moreover, gender equality enhances women's space in political participation

(Krause et al., 2018: 2). Additionally, studies by Hudson et al. (2009) have shown that there is an existing relationship between female security, women's inclusion in political participation and peace. Furthermore, their research suggests that gender equality tends to decrease armed conflict and is hence vital for a society's peace building processes (Krause et al., 2018: 6). Despite the lower levels of armed conflict, research by Caprioli (2005) and Melander (2005) moreover argues that there is a correlation between increased levels of gender inequality and increased levels of civil war onset (Krause et al., 2018: 6).

To further understand the relevance of the theories presented, it is crucial to more in-depth elaborate on the correlation between hunger and conflict. Food insecurity is a catalysator of hunger. When a society does not find stability in food availability, accessibility and utilization, a state of food security cannot be met (Martin-Shields & Stojetz, 2018: 5-6). Koren & Bagozzi (2017: 351) present examples from all African countries between the years of 1997-2009, claiming that combatants, as well as civilians, are dependent on the local agricultural resource production while in immediate conflict. These resources will be obtained at all costs and might therefore be executed through violent actions. However, appearing in peace allows both conflicting parties and civilians to frame their cooperation of sharing and accessing natural resources that provide nourishment. In light of this, the authors argue that when a region experiences a conflict, the frequency of violence against civilians increases due to the immediate need of securing food (Ibid: 351). Therefore, one could assume that peace is a crucial element in order of reaching food security.

As previously stated, research has found supporting evidence for the correlation between peace and women's participation in conflict resolution processes. Krause et al. (2018: 7) argue that one contributing factor to the strong linkage between female participation and peace, is women's ability to create relationships with actors on a grassroot level, such as WCSOs. Chinkin (2003: 10) further claims that female actors have the enthusiasm to address various issues when working towards peace, such as both political and humanitarian concerns. Additionally, the author presents a correlation between post-conflict societies and a high level of violence against women (Ibid: 7). The issue of violence against women is of relevance for matters concerning nourishment, as it is crucial for a state's (in)security.

Enhancing political opportunities for women produce gender equal norms which promote higher levels of women's representation in politics and contributes to inaugurating political, economic and social stability (Haglund & Richards, 2018: 281-282). Given these findings, one can claim that women's societal and political inclusion produce better outcomes

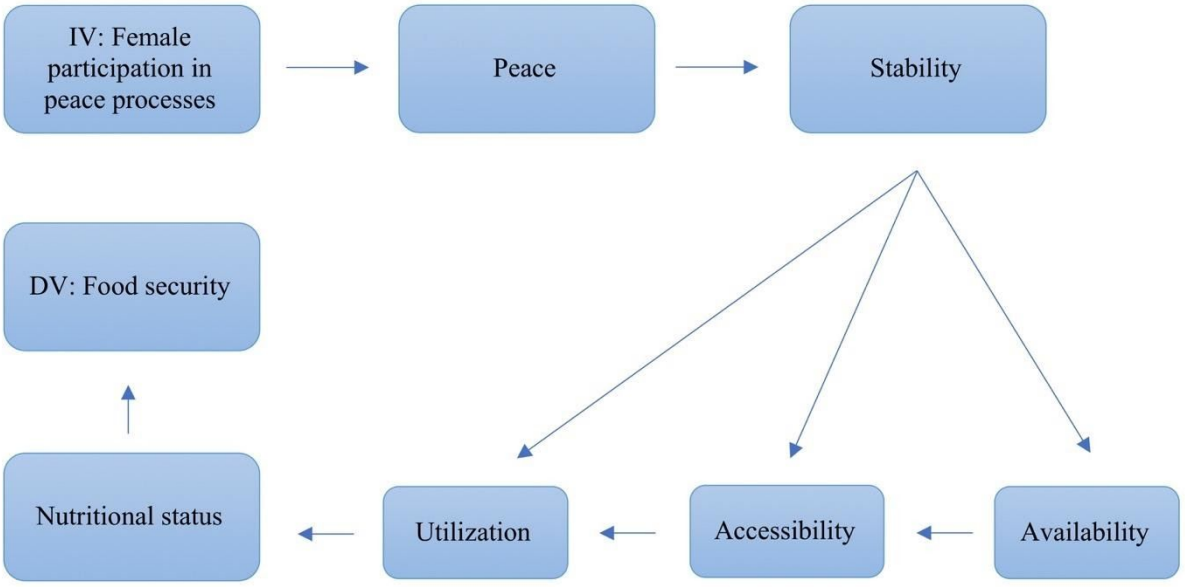
for women in terms of peace and *stability*. One of these reasons consists, as highlighted, of women's capability of initiating cooperation with WCSOs, e.g. rural women who account for twenty-five percent of the agricultural labor force (UN General Assembly, 1979). In addition to academic research, the Swedish International Development Cooperation Agency (Sida) states in their report that women possess a distinctive understanding of the significance concerning local biodiversity and its effects on development, which furthermore is beneficial for food security (Sida, 2015: 1). Sida moreover accounts for the predominance of applying a gender approach on food security. The agency claims that a correlation as such enables transpositions of gender power relations. This shift in turn, persuades the development in policies improving food security for all people. Sida (2015) additionally argues that globally, women are suffering from food insecurity in a wider range than men. This trend depends, according to Sida, on societies' frequent denial of women's fundamental human rights. As women are overrepresented within the agricultural labour force, securing their rights is crucial in order to reach a food secure stage in a post-conflict society (Ibid: 1). Based on this research, the dissertation aims to either support or reject the *hypothesis* stating that "higher levels of female signatories in peace processes lead to lower levels of food insecurity". Thus, the null hypothesis argues that "higher levels of female signatories in peace processes have no effect on lower levels of food insecurity".

2.4 The causal mechanism

In this section, the steps of the causal mechanism will be further explicated. The variation of interest consists of peace processes where female signatories have been included, and peace processes where female signatories are not present.

As the linkages between female participation in peace processes and peace, together with the linkages between political stability and food security have been presented, it is crucial to further understand the significance of the four dimensions of food security from a gender perspective. In addition to academic literature, Sida's (2015: 2) report *Women and Food Security* provides insights of how the four mentioned aspects correlate with food (in)security. These consist of, as precedingly elaborated, availability, accessibility, utilization, and stability. Although this study primarily examines the dimension of accessibility, the causal mechanism includes every aspect in order to enhance the understanding of this relationship. How these elements correlate with the independent and dependent variable can be found in *Figure 1*.

Figure 1. *The causal mechanism*



Note: In line with the hypothesis stating that the presence of female signatories decreases food insecurity, the DV "food insecurity" has been interpreted as "food security" in the causal mechanism.

In sum, female participation in peace processes has been found to enhance peace durability (Krause et al., 2018). Peace in turn, catalyses stability (Haglund & Richards, 2018). Stability is of importance for the availability of food, the accessibility of nutritious resources, and the utilization of such goods. Thus, one can argue that the four dimensions affect each other and are therefore important to include and apprehend. Despite the limitation of the international organization's theoretical discussion, the insight from Sida's report enables strengthening this dissertation's argumentation, and is hence, further explained.

Sida (2015: 2) claims that food insecurity depends more frequently on cultural norms, rather than income and food prices. When a society experiences conflict, the cultural differences between women and men can have contrasting outcomes in relation to risk management, and thus, food security. In the light of a crisis, women's nutritious intake decreases. Additionally, as men according to various cultural traditions, have the entitlement to leave their household for e.g., employment, women are generally left alone to support their family members. Studies from Sida (2015: 1) further show that a mothers' undernourishment is reflected on her child. One can thus argue that women's exclusion in decision-making and arguably their exposure to food insecurity affects the population in a food insecure state as a whole. In addition to the observed female oppression, food availability becomes

compromised. The availability of nutritious resources is dependent on food production, which cannot be fully achieved when encountering gender inequalities concerning ownership to livelihood assets, such as agricultural supplies (Sida, 2015: 2). When a stage of availability isn't met, accessibility cannot follow which amplifies the prevalence of undernourishment, and thus, food insecurity. Sida (2015: 2) further argues that shortages in food accessibility, as well as availability, are governed by cultural norms. Even though the availability of sustenance resources is present, the distribution of nutritious nourishment between women and men is not consistently equally shared. Hence, for availability to meet accessibility, a stage of stability is crucial. Another vital aspect of the four dimensions of food security from a gender perspective is utilization. Features such as food production, consumption and preparation, which women traditionally are in charge of, affect the household's nutritious intake (Ibid: 2).

Hence, one can argue that the process, through which female signatories in peace processes affect the likelihood of food (in)security, is dependent on women's contribution to peace. When peace is determined, a stage of stability arguably will follow. Stability in turn, may enable food availability, food accessibility and food utilization which might enhance nutritional status and thus, food security.

3. Research design

The paper's third section presents the research design, which is aimed to test the presented theoretical claim, and thus, examine the research question. First, the choice of methodology used for the analysis will be outlined and explained. Second, the dataset will be introduced and in order to present the data collection chosen for the analysis. Third, the variables presented in the dataset will be operationalized, which will be followed by a discussion of the validity and the reliability of these variables.

3.1 Methodology

Operationalizing food security, this thesis will primarily focus on FAO's second dimension – accessibility, which by FAOSTAT is measured by mapping the prevalence of undernourishment (PoU). The chosen methodological approach for this analysis is a large-n quantitative study measuring a sample of 139 observations which examines peace agreements signed by post-conflict societies between the years of 2000 and 2011. The missing values are not included in the analyzed data set. All cases are supported by measurements of the independent variable, providing evidence of either the presence or absence of female signatories in the peace processes. Furthermore, five control variables are included in the data set, in order to superintend that there are no other key factors of the research design controlling for the independent variable (Kellstedt & Whitten, 2013: 72).

This paper will, in correspondence to the four criteria for causality, first, establish that there exists covariation between the independent and dependent variables. Second, isolate the linkage from alternative explanations. Third, determine that the described events follow the accurate time order (Kellstedt, Whitten, 2013: 55). Preferably, the thesis would like to test a fourth causal criteria: the correlation of the causal mechanism. However, the research requires to examine whether there exists a relationship between the independent and dependent variable at all, before testing how they correlate. Thus, the causal mechanism will not be tested. Furthermore, this paper argues that time order issues might be present in the analysis, and thus, affect the conducted study. Based on previous research and gaps, this dissertation argues that the dependent variable of *food security* is an aftermath of durable peace. Hence, food security cannot affect female participation in peace processes before durable peace is established. Thus, as the dependent variable might affect the time order, the independent variable will be lagged with one year, in order for it to occur before the dependent variable of food insecurity and hence avoid endogeneity. Moving forward, an

analysis of regression will be conducted. This is appropriate as the independent variable is binary, and the dependent variable is continuous. A quantitative method is suitable as it provides results with high external validity (Gerring, 2006: 38). Furthermore, a regression analysis is convenient as it identifies whether a correlation is independent from other factors, and whether certain components predict a distinct outcome. Thus, the chosen method of analysis for this study is the linear regression of ordinary least squares (OLS). First, the relationship between female participation in peace processes and food security will be tested by conducting a bivariate regression analysis. Second, alternative explanations affecting the relationship will be controlled by conducting a multiple regression. Third, a robustness test will be presented as an additional future step for expounding the study's validity of the dependent variable (Kellstedt & Whitten, 2013: 230).

The analysis will present a p-value that can be interpreted as low, which shows that the probability for the found relationship has high confidence strengthening an existing systematic relationship between the operationalized variables.

3.2 Data set

Two datasets for the conducted analysis have been merged; *the Replication Data for Women's Participation in Peace Negotiations and the Durability of Peace* (Krause et al., 2018), and the *FAOSTAT Data for Food Security Indicators* (FAO, 2020). Krause et al.'s replication dataset is being used as the main data, where indicators from FAOSTAT have been added. As previously discussed, the population measured consists of peace agreements. The sample consists of peace agreements signed during the years of 2000-2011, and the unit of analysis includes all post-conflict societies that have signed peace agreements.

3.3 Operationalization

This section of the research design chapter presents the operationalization of the dependent variable *food insecurity,* independent variable *female signatories,* and the control variables *power sharing, democracy, GDP, female legislators and leftist ideology.*

3.3.1 Dependent variable

The continuous dependent variable *food insecurity* is being operationalized as "the prevalence of undernourishment". Undernourishment is an indicator used by FAOSTAT in order to capture the food (in)security dimension of accessibility. FAOSTAT has coded their

variable of undernourishment by providing percentual insights in each of their observations (countries) spread out over a three-year average. As this interpretation was not compatible with the operationalization of the independent variable, it has been re-coded to the mode value of this average. How this affects the study can be found under section 3.4 which evaluates the validity and reliability of the studied variables.

The reason why the prevalence of undernourishment has been chosen as the indicator for the dependent variable is, in short, based on the previous insufficient definitions of food insecurity's measurements. More precisely, most previous studies measure food *security*, instead of *insecurity*. There exist, as mentioned, various theoretical definitions that enable the operationalization of food security, such as food price increase, child malnutrition, or agricultural value as a percentage of GDP. However, as the phenomenon of food (in)security is based on various complicated aspects, the measurements can be severe to apprehend. This is particularly present when focusing the research on one or few representative aspects of food insecurity, which risks excluding measurements, or initiating new features that do not relate to the study. According to Rudolfsen (2020: 937), this "introduces a mismatch between how food insecurity is defined and how it is measured". Furthermore, Weinberg & Bakker (2015: 310) argue that the measurement of food prices provide more precise operationalisation. Based on these findings, most previous research seems to have chosen to operationalise food (in)security by measuring domestic and international food prices. Rudolfsen (2020: 931-932) on the other hand, claims that although its direct estimate, food prices do not provide sufficient information in regard to food (in)security as nourishment can be secured despite increasing costs. In light of this, the dependent variable's measurement in this study has been defined as the *prevalence of undernourishment*, based on the suitable interference with the independent variable of the research design.

3.3.2 Independent variable

The binary independent variable in this dissertation consists of *female signatories* in peace processes, and is operationalized as female signatories in peace agreements, according to the *Replication Data for Women's Participation in Peace Negotiations and the Durability of Peace* provided by Krause et al. (2018). A female signatory in this context is a women representative from a government, a rebel group or civil society. However, the independent variable does not include representatives from a third party (Krause et al., 2018: 10). This definition supports required aspects of the operationalization, such as the role of women's inclusion, which is essential for the observations of peace agreements to form the data set

required for this study. Initially, the replication data set is collected from UCDP's Dyadic Dataset in accordance with the UN Peacemaker database (Krause et al., 2018: 10). As the replication data set brings focus to armed intra-state conflicts, thus, inter-state conflicts are not being measured. In addition, the data set identifies full and partial agreements, which means that process agreements, and durable partial agreements are not included (Krause et al., 2018: 10).

The authors argue that measuring the presence or absence of such signatories allows for strong indicators of meaningful female inclusion (Krause et al., 2018: 9). The data is coded as either 1 or 0, where the number 1 provides information of a minimum of one female signatory to a partial peace agreement of an armed conflict, while the number of 0, rejects such presence.

3.3.3 Control variables

Controlling for exterior variables is an object of significance for conducting this research. In light of this, the study is analysing five control variables for the value of the independent variable of *female signatories* on the dependent variable of *food insecurity* to be tested. The control variables are being analysed in the linear ordinary least squares regression, more precisely, in the multivariate regression presented in Model 2 under the section 4.2. The variables examined are all to be found in the replication data set provided by Krause et al. (2018). The chosen control variables consist of *power sharing, democracy, GDP, female legislators* and *leftist ideology*.

The ordinal control variable of *power sharing* refers, according to Krause et al. (2018: 11), to sharing provisions based on the three dimensions of military, political and territorial power sharing. Furthermore, this control variable concerns the peace agreement itself (Ibid: 11). Previous research argues that power sharing provisions in peace negotiations enhances peace durability (Krause et al., 2018: 11; Hartzell & Hoodie, 2013). Jarstad and Nilsson (2008) additionally claim that power sharing provisions are particularly beneficial when the disputing parties apply these provisions on their territory and military (Krause et al., 2018: 4). As there is a previously established linkage between conflict and food insecurity (Brinkman & Hendrix, 2011: 8), the aspects that positively affect the opposite of conflict, which is peace, are relevant to control for when examining the value of the independent variable on the dependent variable. Based on these findings, one can argue that the control variable of power sharing is related to the dependent variable of food insecurity. By implementing power sharing and improving peace, conflict might reduce, and thus, decrease food insecurity. In

their replication data set, Krause et al. (2018) have coded power sharing based on if the variable refers to territorial, political or military power sharing. As it is an ordinal variable, the researchers coded power sharing as an additive measure with a range from 0 to 3 depending on the amount of provisions (Krause et al., 2018: 11).

The dichotomous control variable *democracy* has, by Krause et al. (2018: 12), been found in the Political Instability Task Force data set (Marshall, Gurr & Jaggers, 2016). According to Marshall, Gurr and Jagger (2016: 15), "democracy" refers to first, the presence of institutions that allow citizens to express their preferences concerning governing, second, to the existence of institutionalized constraints, and third, to citizens' liberality in their political participation and daily lives. The researchers further include aspects such as freedom of press and rule of law as significant dimensions of democracy. As the variable is coded as dichotomous, it's coding has been included into three measures in the Political Instability Task Force data set, where 0 stands for a non-democratic state, 1 represents a democratic society and 2 refers to full democracy. To further avoid endogeneity, Krausel et al. (2018: 12) have lagged the variable with one year.

The UN General Assembly (1979) claims that rural food production is of significance for enhancing food security. In line with this argument, Brinkman & Hendrix (2011: 8) provide evidence strengthening the fact that democracy has the power of reducing urban bias in policy solutions concerning rural inhabitants. This means that democratic societies possess the responsibility and feasibility to adapt their policies in a way that benefits the rural food producers, and thus, food security. Hence, the control variable of democracy has an important effect in food (in)security.

The continuous variable of *GDP,* or *Gross Domestic Product per capita*, indicates the score of a certain country's economic health by measuring the general domestic production. Krause et al. (2018: 12) and Hudson et al. (2009) provide findings correlating gender (in)equality and economic levels of development. Their results argue that a high level of GDP per capita enhances the durability of peace. As female inclusion has, according to Krause et al. (2018), been found to enhance peace, and thus, rural productivity, GDP per capita is of interest for the dependent variable of food insecurity.

The continuous control variable of *female legislators* has by Krause et al. (2018: 12) been collected from data combined by Paxton, Green and Hughes (2008). According to previous studies, female legislators constitute a chance of enhancing the durability of peace (Caprioli et al., 2010: 100; Shair-Rosenfield, 2017). Thus, it is of interest to include this control variable as it might, as previously hypothesized, impact the correlation between

peace, female inclusion and food (in)security. The variable female legislators are furthermore of interest as it neutralizes a positive result of an increased GDP per capita.

The binary control variable of *leftist ideology* has been included due to the previous findings stating that leftist insurgency groups promote a higher number of female inclusion and seem to be more willing to support women's empowerment and gender equality. Hence, it is of interest to control for leftist ideology among post-conflict societies that are signing peace agreements. Thomas and Wood (2016: 39) define leftist ideology as a Marxist ideology, which in turn refers to socialist, communist, Maoist and Marxist-Leninist ideologies. As the variable is binary, it is coded as either 0 or 1, where 0 stands for absence of leftist ideology, and 1 represents the presence of leftist ideology.

3.4 Validity and reliability

In order to ensure that the variables are precisely measuring what they are considered to operationalize, the feature of validity must be included (Kellstedt & Whitten, 2013: 102). Furthermore, the consistency of the variable's result should be taken into account as well, in order to compile the study's reliability. More precisely, the feature of reliability examines the analysis' probability of reaching the same result if assessed again (Ibid: 102). A large-n analysis requires high validity in order for the observations to be differentiated (Kellstedt & Whitten, 2013: 101).

As mentioned under section 3.3.1, the dependent variable of food insecurity has in previous studies been measured in various ways. Most commonly, researchers have operationalized food *security*, by e.g., looking at food prices or child malnutrition. FAO (2020: 254) argue that when measuring food (in)security, one needs to take the four dimensions[1] of food security into account. These dimensions can be measured in different ways, by e.g., operationalizing the average value of food production, the prevalence of undernourishment, the utilization of safely managed drinking water services, and absence from violence or terrorism. Due to the different measurements of food (in)security, the validity of the dependent variable is low. Furthermore, as the indicator undernourishment which measures food insecurity is coded in a three-year average percentage, this study has re-coded the average to the mode, in order to make the data compatible with the replication data set measuring the independent variable. Hence, given the subjective choice of re-coding the value measuring undernourishment, the reliability of the dependent variable is low as

[1] 1) Food availability; 2) Food accessibility; 3) Food utilization; 4) Stability (FAOSTAT, 2020: 254).

well.

Given that the independent variable of female signatories is binary, the validity of the variable could be challenged. To test the validity in a future study, the variable could be re-coded to an ordinary variable. This would enhance the examination in terms of analysing the effects of a broader or smaller female participation in peace processes. However, as Krause et al.'s (2018) theoretical and operational interpretations have a strong coherence, the validity is high. Moreover, using a binary variable is beneficial for the variable's reliability, as it is not being divided to any sub-categories or measured throughout different ways. Thus, the independent variables reliability is considered strong.

As the control variables of *power sharing, democracy, GDP, female legislators,* and *leftist ideology* have been used in character with Krause et al.'s (2018) approach where the validity and the reliability have been recognized as strong, one could argue that the same applies to the control variables in the present study.

4. Results and analysis

This section aims to present the findings and results from the empirical analysis conducted through first, a descriptive analysis, and second, an ordinary least squares (OLS) regression. The descriptive summary analysis provides in detail information on statistical values for all variables in the data set. Moreover, the linear regression will assist the study in presenting and examining the potential correlation between the variables. Lastly, a considerable explanation of the results is presented, together with the study's limitations and proposed future research.

4.1 Descriptive analysis

As the dependent variable measures the prevalence of undernourishment with a percentual average between three years, the years have been converted to the mode of the average scale. Thus, this increases potential limitations, which is further described under the section 4.4. The independent variable *female signatories* has been lagged with one year's delay in comparison to the dependent variable *food insecurity*. The aim of the lagged variable is to ensure that the peace agreement occurs before food (in)security is established, and thus, to establish a time order and avoid endogeneity. In advance of presenting the outcome of the linear regression and investigating a possible relationship, all variables in the data set have been examined and measured which is shown in the descriptive summary statistics for all the variables in *Table 1*.

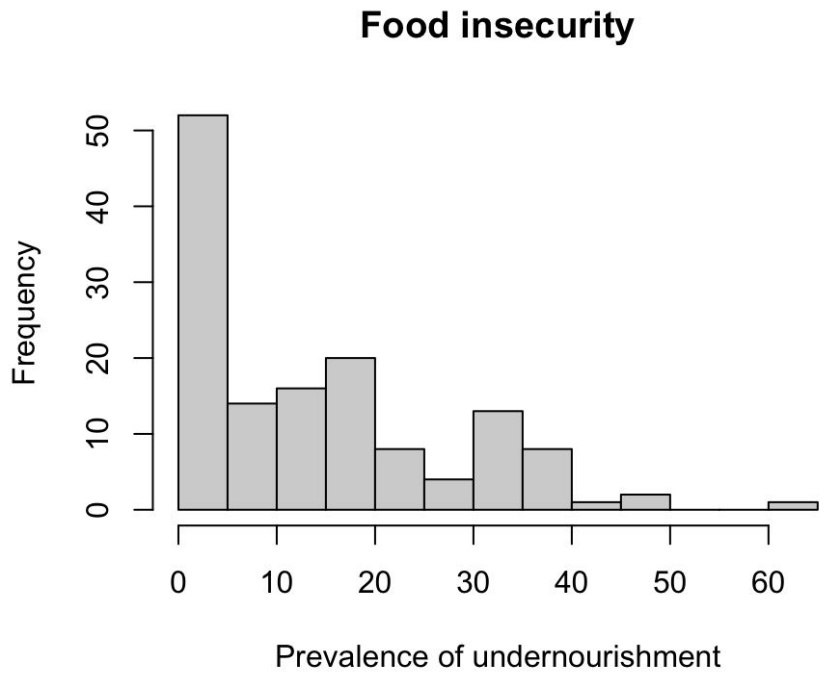
Table 1. *Descriptive summary statistics for all variables in the data set*

Statistic	*N*	*Mean*	*Median*	*St. Dev.*	*Min.*	*Max.*
Female signatories	139	0.17	0.00	0.38	0.00	1.00
Food Insecurity	139	14.89	11.00	12.70	2.49	63.20
Power sharing	139	1.71	2.00	0.75	0.00	3.00
Democracy	139	0.53	1.00	0.50	0.00	1.00
GDP	139	2.86	2.90	0.65	0.00	3.72
Female legislators	139	1.34	1.00	0.86	0.00	3.00
Leftist ideology	139	0.065	0.00	0.25	0.00	1.00

Note: N = number of observations, SD = Standard deviation. Numbers are rounded to 2 decimals.

The range presented for the continuous dependent variable shows a minimum value of 2.49, while the maximum value is 63.20. This illustrates that the observation with the highest number of undernourishment consists of 63.20 percent. Given that the mean value of 14.89 is higher in comparison to the median value, one could argue that the sample provides outliers. An outlier is an utmost high value in comparison to other values for a particular variable, in this case; the dependent variable of food insecurity (Kellstedt & Whitten, 2013: 232). The histogram of the prevalence of undernourishment can be found under *Figure 4*.

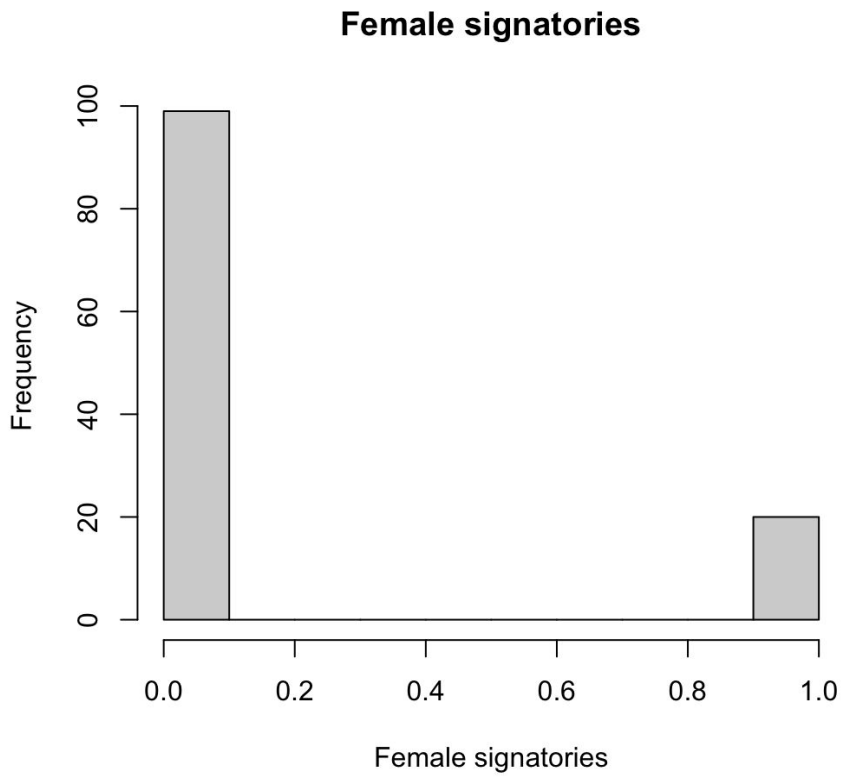
Figure 4. *Histogram of the dependent variable*



The illustration of the table further includes descriptive statistics of the binary independent variable, female signatories, which demonstrates a negatively skewed distribution, where the mean's value is 0.17. The mean value of the independent variable is remarkably low and interprets that 17 percent of the study's observations provide the independent variable's

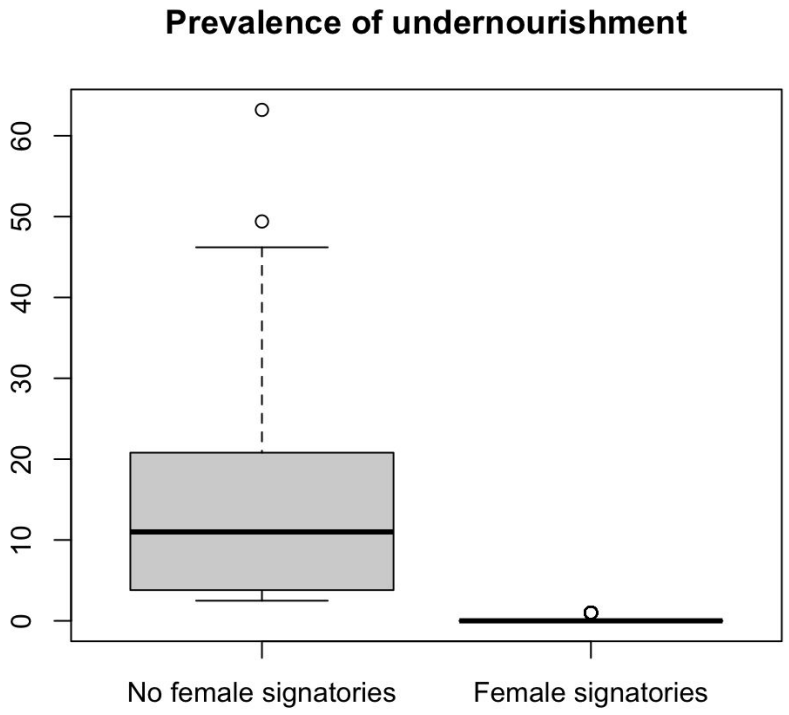
maximum with a value of 1. *Figure 2* below shows the distribution of the value presented in the independent variable.

Figure 2. *Histogram of the independent variable*



Additionally, *Figure 3* beneath presents the variation within the independent variable, and the dependent variable, food security, which is measured by analysing the prevalence of undernourishment in post-conflict societies.

Figure 3. *Boxplot of prevalence of undernourishment*



As shown in the boxplot in *Figure 3*, there is more variation in the dependent variable without female signatories in peace processes being present. This can be further explained by the remarkably low inclusion of women in political decision-making, such as peace processes.

4.2 OLS Regression

In sum, the thesis' hypothesis argues that higher levels of female signatories in peace processes lead to lower levels of food insecurity in post-conflict societies. Thus, the study claims that more female inclusion in decision-making decreases undernourishment. In contemplation of testing this argument, the dissertation has conducted the linear regression of ordinary least squares, consisting of a bivariate and multiple regression. Table 2 presents the effect of levels of female signatories on food (in)security per signed peace agreement. The

bivariate regression is marked as (1)[2] and the multiple regression as (2)[3]. The introduced analyses aim to summarize the relationship between the examined variables. Results from the OLS regression can be found in *Table 2*. Data was analyzed using R Studio software version 1.3.1073 (R Studio, Boston, MA, USA). A p-value of < 0.05 is statistically significant for the test.

Table 2. *Regression analysis table.* The effect of levels of female signatories on food (in)security per signed peace agreement, 2000-2011

	Dependent variable:	
	Food Insecurity	
	(1)	(2)
Female Signatories Lagged	-10.614***	-6.924**
	(2.774)	(3.460)
Power Sharing		-2.885*
		(1.508)
Democracy		-2.802
		(2.198)
GDP		5.414***
		(1.833)
Female Legislators		-0.912
		(1.236)
Leftist Ideology		-8.445
		(5.909)
Constant	15.834***	7.891
	(1.137)	(5.580)
Observations	119	119
R^2	0.111	0.192
Adjusted R^2	0.104	0.149
Residual Std. Error	11.316 (df = 117)	11.025 (df = 112)
F Statistic	14.638*** (df = 1; 117)	4.445*** (df = 6; 112)
Note:		*p<0.1; **p<0.05; ***p<0.01
		SE in parentheses

[2] Model 1 = Bivariate regression
[3] Model 2 = Multiple regression

The bivariate regression in model 1 investigates whether the independent and dependent variables are related, i.e., whether there is covariation and if the alternative covariation is statistically significant. The outcome presents a negative and statistically significant association between the independent and dependent variable. Given the negative relationship, the result shows that female signatories are less likely to provide undernourishment, i.e., food insecurity. More precisely, female signatories are negatively associated with undernourishment, this explains that undernourishment decreases due to the inclusion of female signatories in peace processes. Moreover, the p-value consists of $p<0.05$ and is statistically significant at the level of 95 percent. As the p-value is less than 0.05, i.e., consists of a confidence level higher than 95 percent, there is a low chance that the null hypothesis is falsely rejected (Kellstedt & Whitten, 2013: 147-148). Interpreted from previous studies (Krause et al., 2018; Martin-Shields & Stojetz, 2018), one can argue that the finding provided by the statistical analysis is in line with previous research. To further control for the results when including supplementary aspects, a multivariate regression has been conducted.

The multivariate regression in model 2 examines the independent and dependent variables, including five control variables. It is of significance to include the control variables, in order to investigate whether the introductory correlation persists when analyzing external effects that might affect the correlation between female signatories and food security. Interpreting the multivariate regression analysis, one can find that the coefficient for the independent variable in model 2 has risen to -6.924 but remains negative. Moreover, whilst including the control variables of *Power Sharing*, *Democracy*, *GDP*, *Female Legislators* and *Leftist Ideology* in the second model, the results of the coefficient for the independent variable remain statistically significant, at a level of 95 percent (** = $p<0.05$). In comparison to Model 1, Model 2 implements the best fit as implied by the adjusted R^2 value. The value presented in the multivariate regression consists of 0.192 which states that Model 2 explains 19.2 percent of the variation in the continuous dependent variable of food insecurity.

4.3 Discussion and future research

The results in this study have drawn attention to both lack of academic research on the fundamental linkage between female inclusion in peace processes and food insecurity, as well as to the potential of further in-depth statistical research on the topic. Thus, it opens a door for future study research within the field of Peace and Conflict Studies from a gender perspective. Although the analysis implicates possible covariation, various limitations of the

results are still being identified. Thus, further research is required in order to be able to provide a final conclusion, isolate the correlation and establish statistical significance. Furthermore, a robustness test where the outliers are excluded would be a beneficial control measurement to conduct in a future study of the subject. This section therefore presents a discussion of the results, and is followed by proposals of future research.

The interpretation of the results is that female signatories in peace processes do decrease food insecurity controlling for the post-conflict societies' peace processes' levels of power sharing, democracy, GDP, female legislators or leftist ideology. Despite the findings from previous research, e.g. Krause at al. (2018) and Brinkman & Hendrix (2011), the results in Model 1 and Model 2 have as expected provided a result of a negative correlation between the independent and the dependent variable. Furthermore, the coefficients found for the control variables are statistically significant consisting of a confidence level of 95 percent. One could therefore interpret the results as a support of the hypothesis presented in this dissertation. However, as Model 1 and Model 2 provide significant knowledge for the research, they do not fully test the hypothesis. The multivariate regression analysis instead assists in understanding the effects of female signatories' presence in peace processes on food insecurity while controlling for constant values.

To fully understand the effects of the female signatories in peace processes on the prevalence of undernourishment, test the hypothesis and answer the research question, the analysis would benefit from further research by conducting an interaction model. If statistically significant, an interaction model measuring the correlation between female signatories and food security would provide information concerning the variation in the dependent variable, while controlling for constants. Additionally, the interaction model would moreover be required to examine the variation of *how* female signatories affect food insecurity. This is due to the hypothesis' statement which argues that the presence of female signatories in peace processes decreases the level of undernourishment in post-conflict societies.

When the interaction model has provided support for the hypothesis, a robustness test should additionally be conducted in order to control whether or how the analysis' conclusions change when the assumptions change. To check for robustness, the test would first, run the regression analysis in another software programme. In contemplation of reducing uncertainty and potential risks of selection bias, the robustness test would, second, conduct a test where the dependent variable is re-coded. The data set used for this particular study has been provided by FAOSTAT, where they measure food insecurity within different dimensions,

depending on which of the four food security aspects that are being operationalized. As previously mentioned, these consist of *availability*, *accessibility*, *stability* and *utilization*. This study has analysed accessibility, which by FAOSTAT is measured as "the prevalence of undernourishment". Hence, a robustness test measuring availability by analysing the three other food dimensions by e.g., operationalizing "the average value of food production", examining stability by e.g., operationalizing "political stability and absence of violence/terrorism", and investigating utilization by e.g., "choosing the number of people using safely managed drinking water services" as the dependent variable, would be beneficial for this study (FAOSTAT, 2020).

To further increase a future study's understanding of the variables association, further research might be analyzed. Bjarnegård's (2013: 21) homosocial capital theory, explaining male dominance of parliamentary representation, could hence be of interest. Moreover, adding inputs from disciplinaries as sociology and psychology might as well benefit the comprehension of the analysis. Hardman (2009: 140) e.g., provides knowledge on how females and males interpret risks, which in this particular research might explain what effects it might have on decision-making when including more genders in peace processes. Lastly, Kassin et al. (2011: 442) might contribute with research concerning gender and aggression, which are findings that might contribute in understanding how gender equality correlates with violence and non-violence.

4.4 Limitations and Alternative Explanations

The main *limitation* in this study consists of the lacking knowledge of measurements for operationalizing the dependent variable, food insecurity. Most recent studies measure *security* instead of *insecurity* by e.g., examining fluctuation in food prices, as such operationalization promotes direct measures of variation in each country (Weinberg & Bakker, 2015: 310). However, further studies claim that as food prices focus on the amount spent on food, it does not fully enhance the knowledge of its effects on food security (Rudolfsen, 2020: 938). As previously mentioned, FAO (2020) is measuring food security by looking at indicators related to the four gender aspects of food security: availability, accessibility, stability and utilization. As argued in this dissertation, built on peace - stability promotes food availability and accessibility as well as food utilization. Thus, this thesis has primarily been able to focus on the food security aspect of accessibility. However, such measurement does not cover the picture as a whole and contributes to certain limitations. Due to a lack of previous research on

how to measure food insecurity, one specific indicator for measuring this variable has to date not been established. This further creates uncertainty among researchers, who chose different indicators for the measurement of food (in)security.

Further limitations consist of how the indicator measuring food insecurity is coded in the FAOSTAT data set. As it provides information on the prevalence of undernourishment with a three-year average percentage, the re-coded variable in this study, as described under 4.1, does not entirely present the number provided according to the data set.

Another limitation can be found in the *Replication Data for Women's Participation in Peace Negotiations and the Durability of Peace* which measures the independent variable of female signatories. Although the data set provides a sufficient indicator, it does not come with a code book. Krause et al. (2018) provide an article for the data set where most information is to be found, however, an existing code book would further improve the operationalization.

The data set measuring the independent variable supported a strong validity and reliability. However, the statistics operationalizing the dependent variable found not to possess as strong validity and reliability. This is primarily due to uncertainties among the choice of suitable indicators for measuring food (in)security. As a robustness test has not been conducted, the confidence level of this analysis can be interpreted as low. However, despite its limitations, the study does not show that the presence of female signatories in peace processes would worsen the situation of the current food insecurity that many societies are experiencing.

Furthermore, this study assumes that the countries which have signed peace agreements have done it for a reason of decreasing a conflict they are involved in. Thus, the thesis argues that the 139 observations included in the main data set are all post-conflict societies. As the article belonging to the *Replication Data for Women's Participation in Peace Negotiations and the Durability of Peace* do not include sufficient information concerning this matter, the knowledge whether all observations are post-conflict or not has not been proven. Hence, an identified limitation arises.

In light of the identified limitations, *alternative explanations* can be concluded. Depending on the chosen measured indicator operationalizing food insecurity, one could argue that the analysis would provide different results – an examination that the robustness test enables. Furthermore, the re-coded three-year average measurement for the prevalence of undernourishment might have provided inaccurate results. Finally, the negatively skewed result in the multivariate regression analysis can be explained by the immense low number of

female signatories in peace processes. Hence, the analysis might provide a different result if including data with more female signatories present. All the gendered aspects of inclusion in political decision-making, such as women's participation in peace processes, have not been considered in this analysis, as it only investigates the presence or absence of female signatories. Thus, expanding the dimensions of chosen indicators could be a generative avenue for prospective studies.

5. Conclusion

This dissertation has examined food insecurity by operationalizing undernourishment, in order to find whether there is a correlation between the inclusion of female signatories in peace processes and the decrease of food insecurity. Based on its hypothesis, the thesis argues that a higher level of female signatories in peace processes lead to a lower level of food insecurity. The study showed that there is an association between the analyzed variables. Furthermore, it investigates whether a quantitative approach is the best suitable for examining the presented relationship. As introduced in chapter 2, previous research has found evidence strengthening the correlation between female signatories' inclusion in peace processes and the durability of peace, as well as the relationship between conflict and food insecurity. Despite these findings, there is no research to be found examining the effects female inclusion in peace processes might have on food (in)security. Hence, this thesis has contributed to the identified gap within this particular field of study. The conducted analysis is arguably of significance for both future research, and policy implications in order to interpret the possible relationship between food insecurity, peace and female inclusion in processes striving for peace. Although the study has identified limitations within its research, it does specify significant additions implementing quantitative evidence for a statistically significant ($p < 0.05$) correlation between the dependent and independent variable. The results show a negatively skewed relationship between food insecurity and the presence of female signatories, which strengthens the hypothesis stating that the inclusion of female signatories in peace processes is likely to decrease food insecurity in post-conflict societies. The analysis was conducted by merging a data set from the *Replication Data for Women's Participation in Peace Negotiations and the Durability of Peace* and the *FAOSTAT Data for Food Security Indicators.*

By its analysis, the study is scratching the surface of a broad research field by highlighting gaps, which opens a door for future research. Gender equality in peace processes may, by enhancing durable peace, affect various other aspects of conflict. When measuring the correlation with the presence of female signatories, the presented study suggests that the inclusion of women is beneficial in decreasing food insecurity. Thus, women's role in peace processes should be advanced in coming studies. Future research would benefit from further examining the field in a more extensive way, centralizing the various measurement indicators for food (in)security, and analyzing the causal mechanism.

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7. Appendix

7.1 R Script

```
#' ---
#' title: # "**Dataset and Analysis for Bachelor's Thesis**"
#' author: ## "*Michelle Gano*"
#' date: ### "Fall Semester 2020"
#' output: html_document
#' ---
#'
#'### Clean up memory space:
rm(list=ls())

#'### **Set working directory:**
setwd("~/Desktop/R Thesis Files")

#'### **Run packages:**
library(tidyverse)
library(stringi)
library(readxl)
library(foreign)
library(dplyr)
library("writexl")

-

#'### **Merging datasets**

#Load data set for IV - Female signatories in peace processes:
DATA_IV_CV <- read_excel("DATA_IV_CV.xlsx")

#Load data set for DV - Food security:
DATA_DV <- read_excel("FAO_DV.xls")

#Convert country names into country codes
DATA_DV$cowcode = countrycode:: countrycode(DATA_DV$Area, 'country.name',
'cown')

#Restructuring of the variable 'year':
head(DATA_DV$Year)

#Since these are the averages of two years, I take only the first year:
DATA_DV$year = as.character(DATA_DV$Year)

#Take everything written before the character:
DATA_DV$year = sub("\\-.*", "", DATA_DV$year)
DATA_DV$year = as.numeric(DATA_DV$year)

#Converting years. The data set for DV measures prevalence of
undernourishment with a 3 year-average percentage. Thus, I convert:
DATA_DV$year1 = as.numeric(DATA_DV$year)
DATA_DV$year1 = DATA_DV$year1 + 1

#Merging the two data sets by cowcode and year. This joins the two data
sets by keeping all observations in the female signatories-data and
matching them with available information in the food security-data:
```

```
DATA_ALL <- right_join(DATA_DV, DATA_IV_CV, by=c('cowcode','year', 'Area'))

#Saving data set to my computer:
save(DATA_ALL, file = "DATA_ALL.Rda") #to save a .Rda file (i.e. R data
frame)

#Loading data set:
load("DATA_ALL.Rda")

#Choosing relevant columns in the first joined data set:
DATA_ALL_FIXED <- DATA_ALL %>% select(Area, cowcode, year, Value, pa_name,
fem_sig, pow_sha, dem, gdp, fem_leg, lef_ide)

DATA_ALL_FIXED <- na.omit(DATA_ALL_FIXED)

#Choosing relevant columns in the second joined data set:
DATA_ALL_FIXED2 <- DATA_ALL %>% select(Area, cowcode, year, Value, pa_name,
fem_sig, pow_sha, dem, gdp, fem_leg, lef_ide)

DATA_ALL_FIXED2 <- na.omit(DATA_ALL_FIXED2)

DATA_ALL_FIXED2 <- DATA_ALL %>% select(Area, cowcode, year, Value, pa_name,
fem_sig, pow_sha, dem, gdp, fem_leg, lef_ide)

DATA_ALL_FIXED2 <- na.omit(DATA_ALL_FIXED)

DATA_ALL_FIXED3 <- DATA_ALL_FIXED2 %>%
  mutate( # with mutate, I add new variables
    food_sec = recode(Value, "<2.5" = "2.49"), #I'm choosing appropriate
value to recode to (i.e. the one that made it string)
    food_sec_num = as.numeric(food_sec) #I'm creating a numeric variable
  )

#Renaming the final data set:
DATA_FINAL <- (DATA_ALL_FIXED3)

#Saving the final data set to my computer:
save(DATA_FINAL, file = "DATA_FINAL.Rda")
load("the_dataset.Rda")

-

#'### **Lagging**

#Lag IV before DV (1 year)

#Creating function to lag variable, according to compendium provided on the
R Workshop:
lg<-function(x)c(NA,x[1:(length(x)+1)])

install.packages("data.table")

library(data.table)
```

```
DATA_FINAL <- data.table(DATA_FINAL)

#Lagging:
DATA_FINAL[,fem_sig_1:=lag(fem_sig),by=c("cowcode")]

-

#' ## **ANALYSIS:**

#'### **Descriptive statistics**

library(stargazer)

#'Hlavac, Marek (2018). stargazer: Well-Formatted Regression and Summary
Statistics Tables.
#R package version 5.2.2. https://CRAN.R-project.org/package=stargazer

DATA_FINAL_sub <- subset(DATA_FINAL, select = -c(fem_sig_1, food_sec_num,
pow_sha, dem, gdp, fem_leg, lef_ide, Area, year, cowcode))

DATA_FINAL_sub = subset(DATA_FINAL, select = c(fem_sig_1, food_sec_num,
pow_sha, dem, gdp, fem_leg ,lef_ide, Area, year, cowcode)) #Loading the
variables: IV, DV + 5 controls + variables necessary for merging

summary(DATA_FINAL_sub)

#Add standard deviations to the descriptive statistics.Standard deviation
for each variable:

#'fem_sig_1 #Add these to Word as well
fem_sig_1.sd <- sd(DATA_FINAL_sub$fem_sig)
fem_sig_1.sd
fem_sig_1.sd <- sd(DATA_FINAL_sub$fem_sig,na.rm=T)
fem_sig_1.sd

#'food_sec_num
food_sec_num.sd <- sd(DATA_FINAL_sub$food_sec_num)
food_sec_num.sd
food_sec_num.sd <- sd(DATA_FINAL_sub$food_sec_num,na.rm=T)
food_sec_num.sd

#'pow_sha
pow_sha.sd <- sd(DATA_FINAL_sub$pow_sha)
pow_sha.sd
pow_sha.sd <- sd(DATA_FINAL_sub$pow_sha,na.rm=T)
pow_sha.sd

#'dem
dem.sd <- sd(DATA_FINAL_sub$dem)
dem.sd
dem.sd <- sd(DATA_FINAL_sub$dem,na.rm=T)
dem.sd
```

```
#'gdp
gdp.sd <- sd(DATA_FINAL_sub$gdp)
gdp.sd
gdp.sd <- sd(DATA_FINAL_sub$gdp,na.rm=T)
gdp.sd

#'fem_leg
fem_leg.sd <- sd(DATA_FINAL_sub$fem_leg)
fem_leg.sd
fem_leg.sd <- sd(DATA_FINAL_sub$fem_leg,na.rm=T)
fem_leg.sd

#'lef_ide
lef_ide.sd <- sd(DATA_FINAL_sub$lef_ide)
lef_ide.sd
lef_ide.sd <- sd(DATA_FINAL_sub$lef_ide,na.rm=T)
lef_ide.sd

-

#'### **Histogram of DV and IV**

#Dependent variable:
hist(DATA_FINAL_sub$food_sec_num,main="Food security",xlab="Food Security")

#Independent variable:
hist(DATA_FINAL_sub$fem_sig_1,main="Female signatories",xlab="Female
signatories")

-

#'### **Box Plot**

boxplot(DATA_FINAL_sub$food_sec_num)

boxplot(DATA_FINAL_sub$food_sec_num,main="Prevalence of undernourishment")
boxplot(DATA_FINAL_sub$food_sec_num, DATA_FINAL_sub$fem_sig_1)

boxplot(DATA_FINAL_sub$food_sec_num, DATA_FINAL_sub$fem_sig_1, names=c("No
female signatories","Female signatories"))

boxplot(DATA_FINAL_sub$food_sec_num,
DATA_FINAL_sub$fem_sig_1,main="Prevalence of undernourishment", names=c("No
female signatories","Female signatories"))

-

#'## **OLS Regression**

#'### Bivariate OLS Regression

ols <- lm(food_sec_num ~ fem_sig_1, data = DATA_FINAL_sub)
```

```
summary(ols)

#Godness of fit:Residual standard error: 11.32 on 117 degrees of freedo,
(20 observations deleted due to missingness), Multiple R-squared:  0.1112,
Adjusted R-squared:  0.1036, F-statistic: 14.64 on 1 and 117 DF,  p-value:
0.0002106

-

#'### Multivariate OLS Regression:

ols_2 <- lm(food_sec_num ~ fem_sig_1 + pow_sha + dem + gdp + fem_leg +
lef_ide, data = DATA_FINAL_sub)
summary(ols_2) #see results

#Use the package stargazer to show the results in a neater table:
library(stargazer)
stargazer(ols, type = "text") #one model
stargazer(ols, ols_2, type = "text") #shows the results side-by-side

#'Goodness of fit: Residual standard error: 11.03 on 112 degrees of
freedom, (20 observations deleted due to missingness), Multiple R-squared:
0.1923, Adjusted R-squared:  0.1491, F-statistic: 4.445 on 6 and 112 DF,
p-value: 0.0004522

-

#'## **Table of the Bivariate and Multivariate OLS Regression**

#Change the DV's name
"dep.var.labels = Food Security"

#Table including model 1 (bivariate), and model 2 (multivariate):
model1 <- lm(food_sec_num ~ fem_sig_1, data = DATA_FINAL_sub) #bivariate
model2 <- lm(food_sec_num ~ fem_sig_1 + pow_sha + dem + gdp + fem_leg +
lef_ide, data = DATA_FINAL_sub) #multivariate

#Table as html-file:
stargazer(model1, model2, type = "text", out = "table1.html",
font.size="small", no.space=T, notes= "SE in parentheses", dep.var.labels =
"Food Security", covariate.labels = c("Female Signatories Lagged", "Power
Sharing", "Democracy", "GDP", "Female Legislators", "Leftist Ideology"))
```