Women's Income Distribution in Indonesia Before and After COVID-19

By

HIQMAH, Nurul

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF DEVELOPMENT POLICY

2023

Women's Income Distribution in Indonesia Before and After COVID-19

By

HIQMAH, Nurul

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF DEVELOPMENT POLICY

2023

Professor Merfeld, Joshua D.

Women's Income Distribution in Indonesia Before and After COVID-19

By

HIQMAH, Nurul

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF DEVELOPMENT POLICY

Committee in charge:

Professor Merfeld, Joshua D., Supervisor

Professor Kim, Joeun

Professor Yoon, Chungeun

Approval as of December, 2023

ABSTRACT

WOMEN'S INCOME DISTRIBUTION IN INDONESIA

BEFORE AND AFTER COVID-19

By

Hiqmah Nurul

In the past ten years, women’s income contribution in the household has shown a progressive trend in Indonesia, which frames up the important role of women's income supporting the household economy. When COVID-19 hit in 2020, the government implemented the large-scale social restrictions to control the COVID-19 spread, putting women as vulnerable group in the society. This study unraveled the impact on women’s income distribution before and after COVID-19. Cross sectional data was collected from 2013-2022 using the National Labor Force Survey by Statistics Indonesia, classifying 2013 to 2019 as the year before COVID-19 and the year after COVID-19 from 2020 to 2022. Consumer Price Index (CPI) was used to adjust the income. The regression result discovered the evidence that women’s income has been declining after COVID-19. However, the findings revealed that women's status as the head of the household doesn’t experience lower income after COVID-19. This decrease was identified in women marital status, bachelor degree or equivalent level, overwork setting, and employment status as self-own worker. This finding may be used as a resource for the Indonesian government to enhancing policy effectiveness for strengthening women's reciliency and narrowing the income gap between gender.

ACKNOWLEDGMENTS

I wish to convey my heartfelt appreciation for the blessings from Allah SWT, and also my husband who always gives me an unwavering pillar of support to flourish academically. My dearest parents, my parents-in-law, my siblings, and all my relatives for their love and never-ending prayers throughout this journey. Furthermore, I want to express my appreciation to Professor Merfeld Joshua for the guidance, and constructive feedback which significantly contributed to the successful completion of my research project in KDI School. I am also extremely grateful to Professor Joeun Kim for her expertise and enlightening comments in completing my research.

This journey to pursue a master's degree in Korea would not have been possible without the academic scholarship from KOICA. I also want to express my sincere appreciation for BPS Kota Jakarta Barat, and BPS Provinsi DKI Jakarta as my institution for allowing me to further my education. This support has been instrumental in advancing my educational capabilities.

My highest appreciation for KDI School, which providing me with an outstanding learning environment in public policy and management. The diverse courses, expert professors, and supportive staff have been crucial aspects for shaping me in this academic journey. I'm also grateful for the precious chance to connect with international students from around the world. Lastly, to my dearest KOICA Fall 2022 batch and KDI friends, your support and friendship have added color and joy to my life in Sejong.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

I. INTRODUCTION

The effects of the COVID-19 outbreak have received a lot of research attention, either from a direct or indirect framework (Gibson & Olivia, 2020; Kansiime et al., 2021; Dang & Viet Nguyen, 2021; UNICEF, 2021; Miranti et al., 2022). In the case of Indonesia, the government set up the large-scale social restriction to reduce the spread of COVID-19 outbreak starting from April 2020 and has officially stopped all kind of social restriction as of December 31, 2022. The restriction has caused economic downturn especially in the urban area, leaving the companies with no other choice than to reduce the working hours or to lay off the employees in order to minimize their operational costs. The domino effect for the labor was they experiencing the income losses (see also SMERU, 2021).

The COVID-19 outbreak also had a disproportionate impact on women's income. In Association of Southeast Asian Nations (ASEAN) countries, women and young workers (both men and women) are the two groups that have been particularly impacted by job losses because of the pandemic (ILO, 2021). More recent debate shows that, in several aspects, inequality for women has worsened after the pandemic (Miranti et al., 2022). Madgavkar (2020) claims the inequality for women is happening because on one hand, women have to carry out their role as unpaid workers to take care of the household, and on the other hand, women also have to struggle to work and earn income to fulfill the needs of their families. Making women more vulnerable than men in terms of economy (Madgavkar, 2020).

The percentage of working women in Indonesia from 2015-2022 shows an increase even though the number is always below the percentage of working men. However, women are facing a greater impact, as shown by the percentage of women workers has dropped from 39.19% in 2019 to 34.65% in 2020 (Statistics of Indonesia, 2022).

The urgency of this study, if women suffer after COVID-19 because of income loss, many families would encounter economic shock. Despite of the income decline, women's income contribution in the household is showing an increasing trend. In the past 12 years, women's income contribution has grown from 33,5% in 2010 become 37,22% in 2021 (Statistics of Indonesia, 2022a).

Furthermore, the percentage of women who become the head of the household also shown an increasing trend, from 14.17% in 2009, 15.46 % in 2019 to 15.82% in 2020. A number of recent studies have addressed the issue of income inequality between men and women during COVID-19 pandemic (Ravallion, 2014; Putri et al., 2015; Wahyuni, 2017; Sauqi et al., 2022). However, there is limited research focused on women's income distribution within the women themselves. A Report by UNICEF (2021) revealed that households with women as household heads are more vulnerable because they are responsible for fulfilling family expenses. Kowalewska and Vitali's (2021) research concentrated on women's breadwinner economics characteristics but didn't cover the effect of COVID-19. From several previous studies, little is known about income distribution before and after COVID-19 for women that explore the longitudinal data further in the scope of Indonesia and examine how deep is the difference in a certain area as mentioned below by eliminate the Inflation effect using Consumer Price Index (CPI).

The issue of women's income should be identified in the first place, to address the multidimensional impact in the upcoming period. This study aims to extend the area of

investigation by addressing the issues of women's income distribution. This study aims to address the following research questions : Is there any difference in income based on head of the household status of women, marital status, overwork status, education, self employed and employee status after COVID-19?. This analyses are compiled into one set of studies to gain a better understanding and more comprehensive description of income inequality. This study uses both narrative and empirical approaches.

This paper is structured into 5 chapters, the first chapter is explaining the introduction, background and urgency of examining women's income distribution in Indonesia. Chapter 2, review the relevant literature about the effect of COVID-19 on women. Chapter 3, describes the research methodology and an overview of the research data. Chapter 4, features the results of data analysis and research questions as well as a descriptive explanation of the output of data processing. Chapter 5 marks the conclusion and policy recommendation, highlighting the study's implications.

II. LITERATURE REVIEW

Integrating women into the labor market can be beneficial to economic growth (Klasen, 2009; Kargi, 2014). The increasing participation of women in the workforce contributes to household income earnings.

2.1 Income Deprivation for Women due to COVID-19

Two economic perspectives are widely known in measuring income distribution. According to Todaro (1989), first, is the functional distribution of income and the second is the personal distribution of income. Briefly explained, the functional distribution of income or factor share distribution describes the total national income received from each factor of production. The attention of this concept is not to see the individual as a separate entity. On the other hand, the personal distribution of income which points out the total income received for each individual or household. For this study, the concept of personal distribution of income will be used to examine the problem.

COVID-19 outbreak has exacerbated women's economic conditions multi-dimensionally. Multitude of research on the effect of COVID 19 for women has been claimed in many parts of the world (Kalyanpur et al., 2020; Oo & Lim, 2021; Nordhues et al., 2021; Casale & Posel, 2020). Reichelt et al. (2021) reported that, women’s transition to unemployment and the reduction of working hours were more frequent than men in United States (US), Germany and Singapore with different intensities across the three countries. In the US, the severe effect of COVID-19 on women was presented by the high unemployment rate of 16.2% compared to men (13.5%) in April 2020 (Nordhues et al., 2021).

Supporting evidence from South Africa, during the lockdown period, women were more adversely impacted than men. Severe conditions happen to two-thirds of women that lost their jobs between February and April 2020 (Casale & Posel 2020). Moreover, Casale and Posel (2020) reveal there was also a greater decline in the average number of hours worked per week for women than for males among those who continued to be employed. Indicating how widely COVID-19 affects the economy (see also Casale & Shepherd, 2020).

The COVID-19 effect is slightly different in Australia, as Oo and Lim (2021) found that women with full employment status in the construction industry, experienced changes in their job situation during the pandemic, including working hours and location of the job. Women in the construction industry still have an optimistic perception in terms of the negative effect of COVID-19 such as earnings, job security, and carrier advancement. The limitation of the study, it only covers women in the construction industry sector and can't portray the big picture for women thoroughly.

Meanwhile in the ASEAN region, ILO (2021) reported that, 7.8% of labour income was lost, and women and young workers are groups of workers who have been most negatively impacted by job losses. This issue become important because the percentage of labor income lost in ASEAN countries during the first half of 2021 was higher than the world and from the Asia Pacific countries. Indonesia was one of the 4 countries with the highest drop in working hours due to the pandemic and affecting to income earning.

Additionally, despite of the loss of income for women, according to Statistics Indonesia (n.d), women's income contribution in the household has grown rapidly over the past 10 years, from 33,5% in 2010 become 37,22% in 2021. Emphasizing the strong role of women's income in

society, the research that has been conducted in Pekanbaru region in Indonesia shows that working women have the potential to support their family's economy because their income contribution to their family's economy is quite large (Farida, 2011).

Table 1.

Overview of Recent Scholarship on Women's Income Distribution

No.	Authors	Year	Country	Findings
COVID-19 effect on Income				
1	Gibson & Olivia	2020	Indonesia	• With potential loss of income, COVID-19 in long term more likely to affect both quantity and quality of life.
2	Kristal	2020	Israel	• The economic lockdown because of COVID-19 outbreak have a more severe effect on employment status for women and earnings than it will on men's in the case of Israel.
3	Kansiime, et. al	2021	Kenya, Uganda	• Income drop caused by COVID-19 disruption was experienced by more than two-thirds of the respondents. • Households with lower income levels, as well as those reliant on income from labor, exhibited a harshly effect to income disturbances and experienced a decline in food consumption quality during the COVID-19 pandemic when contrasted with other respondent groups.
4	Sari & Zufar	2021	Indonesia	• Women's income before COVID-19 was higher and expenses during the

No.	Authors	Year	Country	Findings
				pandemic were greater even though income had decreased, study cases in Surabaya, Indonesia.
	Women Head of the Household			
1	Kalyanpur et al.	2020		• Single breadwinners women in their families experiencing job loss as a fast rate, and the effect of COVID-19 was felt to be greater on Black, Indigenous, and other People of Color (BIPOC) people.
2	Kowalewska and Vitali	2021	20 countries	• In comparison with dual breadwinner, and male breadwinner, female breadwinner exposed to higher possibilities of having a low income
3	UNICEF et al.	2021	Indonesia	• In Indonesia, 90% of primary earners in female-headed families and 89% of those who live with disabled family members put in considerably fewer hours of work each week.
4	Sauqi et al.	2022	Indonesia (Banda Aceh Province)	• Before and during the COVID-19 pandemic, poor women headed households experience in difference in their earning.
5	Akalu	2023	Ethiopia	• In Ethiopia, women headed households are more at risk to experience moderate or severe food insecurity resulting from income deprivation, reaching 5.7% points

No.	Authors	Year	Country	Findings
				difference higher than men headed household.
	Marital Status			
1	Jones et al.	2015	United States	• This finding suggests that married women manage their work hours significantly in response to changes in discrimination.
2	Alon et al.	2020	United States	• Before the crisis, mothers often took care of the bulk of the children with both parents exist in the household. • Family settings with both parents exist, it is expected that women will experience a greater impact from the crisis if the existing distribution of labor within the family remains unchanged.
3	Ham	2021	South Korea	• The gender disparity during Covid is further impacted by women's marital status. • The gender inequalities in unemployment is explained by age, education, and marital status differences, which together account for 14.5% of the difference.
4	Abraham et al.	2022	India	• The impact of marriage differed for men and women, as married men displayed a higher likelihood of returning to work compared to married women.

No.	Authors	Year	Country	Findings
Overwork				
1	Cha	2013	United States	• In occupations with a male predominance, overworking mothers are more likely to leave the labor force.
2	Cortes & Pan	2017	United States and 17 Western European countries	• Occupational segregation and the underrepresentation of women in certain industries, particularly within the business and technology sectors, may, in part, stem from differences in the demand for extended working hours and the restrictive nature of working conditions across various occupations. • The intensity of overwork affects participation of women in the labor force, and career option by making the workplace less desirable for those who have family responsibilities.
3	Casale & Posel	2020	South Africa	• A harsh decrease in the average number of working hours per week for women than for males among those who continued to be employed.
Education				
1	Adams-Prassl et al.	2020	United Kingdom, United States , Germany	• College graduates who are still employed in the United States and the United Kingdom are less likely to have their incomes decline than those who are not.

No.	Authors	Year	Country	Findings
2	Zamarro	2020	United States	• Women without college degrees experienced the greatest declines in employment during the COVID-19 crisis.
3	Abraham et al.	2022	India	• The risk of losing a job was higher for highly educated female employees.
4	Goldin	2022	United States	• Around 42% of those with college degrees continued to work from home by the fall of 2020, compared to 13% of those without a college degree.
5	Kugler et al.	2023	Developed countries	• During pandemic, there was an 8 percentage point higher likelihood of women resigning from their jobs compared to men. • women were 8 percentage points more likely than men to quit their jobs • The gender gap was larger for women than for men in terms of levels of education (there was a 4 percentage point difference that occur between workers with low and high levels of education).
Employment Status				
1	Graeber et al.	2021	Germany	• Women as self-employed in Germany are much more affected by the systemic shock than other segments of the working population

No.	Authors	Year	Country	Findings
2	Kalenkoski & Pabilonia	2022	United States	• Married women who were self-employed found themselves obligated to exit the workforce to caring their children. It is often due to societal gender expectations and the division of labor roles within households.
3	Tasmilah	2022	Indonesia	• Women who work as self-employed are more likely to lose their jobs during the pandemic and dropping out of the workforce. • Employees more likely to seek for a new job rather than exit from the labor market

A comprehensive analysis of the literature conducted for this study formed a foundation for this research. Sauqi et al.'s (2022) has limitation in the scope of the research because only cover a certain region in Indonesia (Banda Aceh). Tasmilah's research identified the determinant factors that affect women's exit from the labor market. However it didn't count the income variable. Following the assessment of earlier studies by Tasmilah (2022) and Sauqi et al. (2022) on the effects of COVID-19 on women, by integrating these characteristics and their impact on income, this research will investigate the implications of COVID-19 on women in order to identify any potential gaps that can be filled. The next part of this paper will examine the details of those measures and their impact on income distribution for women.

III. RESEARCH METHODOLOGY

The aim of this study is to extend the area of investigation on the effect of COVID-19 on income distribution of women using the national level data and provide an examination of women's income distribution in Indonesia. The objective is to answer whether the COVID-19 outbreak had a significant impact on women's income, and what are the characteristics of women's workers after COVID-19. To achieve this objective, quantitative analysis is used by using the secondary dataset from Statistics Indonesia (BPS). Empirical methodology in this study follows the regression analysis approach to examines the relative changes in women's income as an impact of COVID-19 outbreak.

3.1 Data Collection

The data source for this study was fetched from the National Labor Force Survey by Statistics Indonesia (BPS) which is used to collect the indicators for employment covering the age 15 years and above. This survey is held twice a year, in February and in August. However, considering the COVID-19 in Indonesia that was happening after February 2020, the annual data used in this study was from the National Labor Force Survey that was held in August with larger households samples describe in Table 1.

Table 2.

Description of Samples

Year	Freq	Percent	Cum.	Weights
2013	111,860	8.23	8.23	Projection results of the 2010 population census
2014	112,011	8.24	16.47	Population projection for 2010 - 2035
2015	116,861	8.60	25.06	Population projection for 2010 - 2035
2016	30,386	2.24	27.30	Population projection for 2010 - 2035
2017	126,643	9.32	36.61	Population projection for 2010 - 2035
2018	123,512	9.09	45.70	Population projection for 2010 - 2035
2019	187,194	13.77	59.47	Population projection for 2010 - 2035

2020	186,387	13.71	73.18	2015 Intercensal Population Survey projection
2021	184,513	13.57	86.75	2015 Intercensal Population Survey projection
2022	180,109	13.25	100.00	2015 Intercensal Population Survey projection
Total	1,359,476	100		

Note. Adapted by the author from Statistics Indonesia (2013-2022)

To find out the trend of women's income before and after COVID-19, this study will use cross section data from 2013-2022. The year 2013 until 2019 will be grouped into the time before COVID-19 occurred and the year 2020-2022 will be grouped into the time after COVID-19 occurred. The Consumer Price Index (CPI) from Statistics Indonesia (BPS) also used to exclude the effect of inflation for the income variable. In this study I'm using the weights projection results of the population census given by Statistics Indonesia as mention in Table 1.

3.2 Variable Description

The definition of variables in this study refering to the concept in the National Labor Force Survey by Statistics Indonesia.

3.2.1 Dependent Variable

Income

The definition of income in this study is based on the concept from the National Labor Force Survey by Statistics Indonesia. **Income/net wages/salaries** are the compensation for employees/office worker receive on a monthly basis, either in the form of money or goods, provided by their company, office, or employer in Indonesian currency (Rupiah). Rewards in the form of goods are valued at local prices. Wages/The net salary referred to is after deducting from essential contributions, income taxes, and so on. Following the National Labor Force Survey questionnaire, income variable in this study only covers the workers from self-own worker, employees, casual workers in agriculture and casual workers in non-agriculture status, whereas the

income from three other categories, employer assisted by temporary workers/unpaid worker, employer assisted by permanent workers/paid workers and family/unpaid worker was not covered from the data. In this study I will use the term "*Adjusted Income*" which was counted with Consumer Price Index (CPI).

3.2.2 Explanatory Variables

Age Group

International Labour Organization (ILO) uses the age 15 year above as the working age population align with Statistics Indonesia which also adopt this concept and using the 5 year band to classified the employment group. Considering the retirement age in Indonesia which is around 57-58 years, this study will limit the population age from 15-59 years old with using the 5 year band, 15-19 years, 20-24 years, and so on.

Education

In this study, the education level will be classified into five categories, which are :

1. Primary Education or equivalent level, including education below primary level, informal primary education (Paket A), primary education for special needs, and non-formal junior high school (Paket B).
2. Secondary education or equivalent level, including Junior High School, Non-formal Junior High School (Paket B), and Special Needs Junior High School.
3. Tertiary education or equivalent level, including Senior High School, Non-Formal Senior High School (Paket C), Special Needs Senior High School.
4. Vocational Education/School, including Vocational High School.
5. Bachelor's or equivalent level, including Diploma, Bachelor Master, and Doctoral.

Consumer Price Index (CPI)

Definition: “The CPI measures the pure price change in a designated basket of goods and services (with consistent quantity and quality) commonly acquired by Indonesian households. The index is formulated as a stable, base-weighted price index using the Laspeyres model.” (Statistics Indonesia, 2023).

Starting from January 2020, the Consumer Price Index (CPI) has been computed with the base year set as (2018=100). Before this change, the CPI had been calculated using the base year of 2012. In this study, I adjusted the changes between those two base years (2012 and 2018) and selected the year 2013 as the base year for the research data.

Industry

In the National Labor Force Survey, before 2018, the Industry was classified into 17 categories which refer to the Standard Classification of Indonesian Business Fields (KBLI) 2015 which is based on the International Standard Industrial Classification (ISIC) revision 4. In this study, I will only utilize the top 5 sectors that were dominated by women workers.

1. Agriculture, Forestry, and Fisheries; This category includes all economic activities/business fields, which include food crop farming, plantations, horticulture, animal husbandry, harvesting forest products, and catching and cultivating fish/water biota. This category also includes supporting services for each of these economic activities.
2. Wholesale and Retail Trade; Car Repair and Maintenance; Including economic activities in wholesale and retail scale trade for various types of goods without changing its form. This classification also include car and motorbike services.

3. Processing Industry; Including business and economic activities which transforming the physical components into new products. There is a significant reconstruction, change, or renovation of goods as well as materials from other industrial processing activities.
4. Provision of Accommodation and Food and Drink; Including serving food and beverages for immediate consumption and offering temporary lodging for visitors/travelers.
5. Education Services; Include all types of educational services from various institutions including formal and non-formal educational institutions, for example adult education.
6. Other sectors, including Quarrying and Mining; Procurement of Gas and Electricity; Waste and Recycling, Water Procurement, and Waste Management,; Construction; Transportation and Warehousing; Information and Communication; Financial Services and Insurance; Real Estate; Corporate Services; Government Administration, Defense, and Social Security; Social Activities and Health Services; Other services.

Working

Work during the survey week for at least one hour by a person to get paid or assisting others in earning income or profit. Person who helps the economic activity/business as the unpaid worker also included.

Overwork

In this study, working hour which counted 50 hours or more in a week will be considered as overwork.

Employment Status

Employment status is the type of position a person working in a business/activity which is classified into 7 categories as follows:

1. Self-Own Worker : An individual who works and carrying their own risk, including job that requires technical skill.
2. Employer assisted by temporary workers/unpaid worker: An individual who operates independently, assuming personal risk and receiving support from temporary or unpaid workers
3. Employer assisted by permanent workers/paid workers: a person who assisted by at least one permanent worker (paid) for their businesses and carrying their own risk
4. Employee: An individual employed on a permanent basis by a company/institution, and earn salary (goods and money) for their compensation. Workers without a fixed, ongoing employer are considered casual laborers rather than employees.
5. Casual agricultural employee: An individual who is not in permanent employment with a single employer or institution within the agricultural sector, be it related to home-based or non-home-based industry, and receives compensation in the form of monetary payment or goods. This compensation may be structured on a daily or contract basis. The agricultural industry encompasses activities related to food production, plantations, forestry, livestock, fishing, hunting, as well as agricultural services.
6. Non-agricultural casual employee: An individual who is not in permanent employment with a single employer or institution within the non-agricultural sector, having worked for multiple employers in the past month, and receiving compensation in the form of monetary payment or goods. This compensation may be structured on a daily or contract basis. The non-agricultural sectors encompass activities in manufacturing, mining, gas, electricity, and water supply, construction, trade, transportation, storage, communication, finance, insurance, real estate, business services, as well as community, personal and social services..

7. Unpaid/Family worker: An individual who engages in work for others but does not receive compensation in the form of cash or goods.

3.3 Formulation (Estimation Method)

3.3.1 Regression Model

Equation (1) analyze the impact of COVID-19 outbreak on women's income with status as the head of the household by introducing a dummy variable (*HHH*).

$$y = \beta_0 + \beta_1 Age + \beta_2 Covid_{Year} + \beta_3 HHH + +\beta_4 (HHH * C.Year) + \beta_5 (HHH * Covid_{Year}) + \beta_6 Uni + \beta_7 Married + \varepsilon \ldots (1)$$

Where *Age* represent the age of individuals; $Covid_{Year}$ is a dummy variable which equals one for the years after COVID-19 from 2020-2022, and zero otherwise; *C.Year* is define year as a continuous variable; *HHH* describes the dummy variable that equals one for women with status as the head of the households and zero otherwise; Uni represent the dummy variable for education level that equals one for women with bachelor degrees or above, and zero otherwise; *Married* is a dummy variable for the marital status which equal to one for married women and zero for single, divorced, and widowed.

In equation model (1) β_1 represent the change in income for every one-year increase in age. The estimated coefficient β_2 represents the difference in income before and after COVID-19 periods for women, and β_3 reflects the estimation of the change on the women's income for *HHH* status of a women. The coefficient of interest β_4 (*HHH*C.Year)* describe the effect on income of having the HHH status which interact with year as a continuous variable that measure the year of observation. The estimated coefficient β_5 which include the interaction term (*HHH*Covid*$_{Year}$*)* represent how is the effect on income from the HHH status interact with $Covid_{Year}$ to see the change

of income before and after COVID-19 strike. $\beta_{6,}$ β_7 are the control variable that represent the change in income for every one unit increase in *Uni,* and *Married*. Finally, ε is the statistical error term of the model.

The regression model for women's income from the marital status, takes the following forms:

$$y = \beta_0 + \beta_1 Age + \beta_2 Covid_{Year} + \beta_3 Married + +\beta_4 (Married * C.Year) + \beta_5 (Married * Covid_{Year}) + \beta_6 Uni + \varepsilon \dots (2)$$

This model emphasizes whether COVID-19 and marital status significantly influence the income. β_3 accommodates the conditional effect of women's marital status on income. β_4 reflect the interaction of marital status with year as a continuous variable. The coefficient β_5 describe the effect on income for both condition (*Married*Covid*$_{Year}$).

The third estimation model investigate the effect of overwork on women's income as follows:

$$y = \beta_0 + \beta_1 Age + \beta_2 Covid_{Year} + \beta_3 Overwork + +\beta_4 (Overwork * C.Year) + \beta_5 (Overwork * Covid_{Year}) + \beta_6 Uni + \beta_7 Married + \varepsilon \dots (3)$$

The estimate coefficient β_3 reflects the change in income for *Overwork* women and the interaction term. In β_4 (*Overwork*C.year*), the estimated coefficient represent the effect in income with interaction for both overwork women, and year as continuous variable. Another interaction term to examine the effect in income for overwork women before and after COVID-19 accommodate in β_5 (*Overwork*Covid*$_{Year}$).

The fourth estimation model investigate the effect of education level on women's income before and after COVID-19:

$$y = \beta_0 + \beta_1 Age + \beta_2 Covid_{Year} + \beta_3 Uni + +\beta_4 (Uni * C.Year) + \beta_5 (Uni * Covid_{Year}) + \beta_6 Married + \varepsilon \ldots (4)$$

The estimated coefficient β_3 represents the change in income for women with bachelor degrees or above. In β_4 the interaction (*Uni*C.year*) between the education level and the year was added to see the difference in the effect in income from the education level and year as continuous variable. The interaction to examine the change in income by education level before and after COVID-19 describe in β_5 (*Uni** $Covid_{Year}$).

The two last equation form represent the effect of COVID-19 on women's income from the employment status, which focus on the self-employed and employees.

Self-Employed

$$y = \beta_0 + \beta_1 Age + \beta_2 Covid_{Year} + \beta_3 Self\_employed + +\beta_4 (Self\_employed * C.Year) + \beta_5 (Self\_employed * Covid_{Year}) + \beta_6 Uni + \beta_7 Married + \varepsilon \ldots (5)$$

Coefficient β_3 represents the effect in income for self_employed women, and coefficient β_4 accommodates interaction of *Self_employed* and *Year* as continuous variable. The coefficient β_5 reflect the interaction of *Self_employed* with $Covid_{Year}$ to examine the effect on income for both condition (*Self_employed** $Covid_{Year}$).

Employees

$$y = \beta_0 + \beta_1 Age + \beta_2 Covid_{Year} + \beta_3 Employees + +\beta_4 (Employees * C.Year) + \beta_5 (Employees * Covid_{Year}) + \beta_6 Uni + \beta_7 Married + \varepsilon \ldots (6)$$

Additional coefficient β_3 represents the effect in income for women employees, and coefficient β_4 accommodates interaction of *Employees* and *Year* as continuous variable. The coefficient β_5 reflect the effect on income for interaction between (*Employees***Covid*$_{Year}$).

IV. RESULT

4.1 Descriptive Statistics of Women's Income Distribution Before and After COVID-19

4.1.1 Head of the Household Status

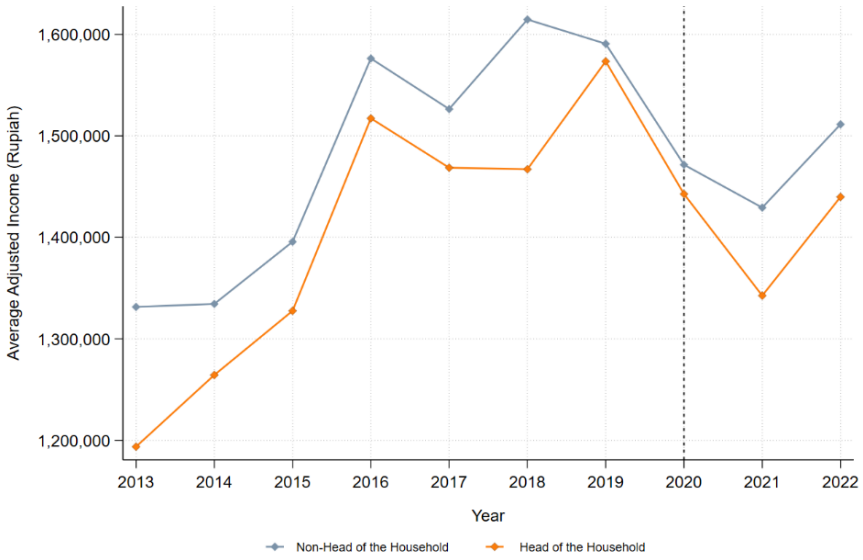
Figure 1 illustrates the average income transition before and after COVID-19 for women as Heads of the Household (HHH). From 2019-2022, the average income experienced a decrease of 8.49%, while non-HHH women faced a decrease of 4.99%.

Overwiew picture of women HHH marital status, in 2019 before COVID-19, the majority of women HHH are divorced (22.58%) and widowed (49.06%). The employment status mostly becoming an employees (36.06%), and self-own worker (32.62%). Industry sector concentrated in Agriculture, Forestry and Fisheries (23.88%), and Wholesale and Retail Trade; Car Repair and Maintenance (22.83%), and Processing Industry (15.24%). Education level was dominated by primary education or less which takes up to 52.03%, and only 12.30% reached bachelor degrees or equivalent level. The educational disparity becomes visible when it is examined through the context of urban and rural areas. Women HHH with primary education or less are predominantly from rural areas (54.76%), while the bachelor degree or equivalent level are predominantly from urban areas (79.41%).

After COVID-19, the number of women HHH workers were declining in 2020 and start to increasing again from 2021 to 2022. Highlighting the shifting trend in 2022, the employment status has been flipped. Women HHH change to self-own worker, it make the vast of majority with 36.29%, and women as employees with 33.78%. The industry sector for women HHH who work in Agriculture, Forestry and Fisheries was declining 0.8% from 2019-2022. Meanwhile, several sectors has been rising, with the top 3 sectors are Processing Industry (0.59%), Wholesale and Retail Trade; Car Repair and Maintenance (0.63%), and Professional, Scientific And Technical Activities (0.59%).

Figure 1

Women's Average Adjusted Income by Head of The Household Status



Note. Author's own

4.2.2.Marital Status

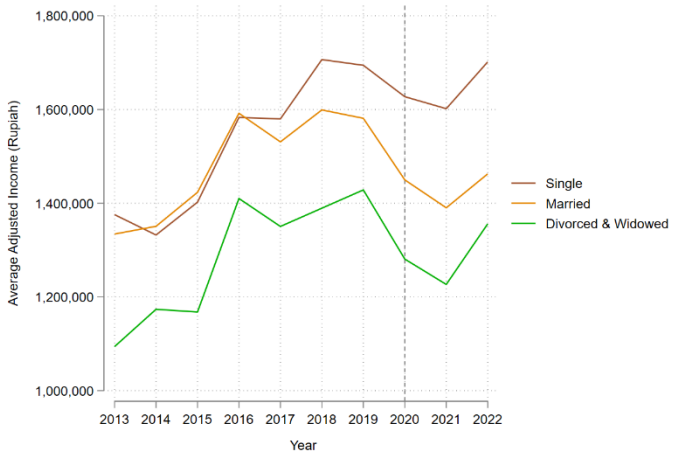
In 2019, the landscape of women workers by marital status before COVID-19, 72.14% were married women, 17.82% single women, and 10.05% was divorced and widowed. Focusing on married women, the employment status was dispersed as self-own worker (20.77%), employees (32.90%) and unpaid/family worker (26.19%). Industry sector for women married women was quite segmented with 4 big sector which are Agriculture, Forestry and Fisheries (26.18%), Processing Industry (16.60%), Wholesale and Retail Trade; Car Repair and Maintenance (23.50%), and Provision of Accommodation and Food and Drink (10%). Married women was dominated by low educated women with 41.05% only reached primary education or less. In contrary, single women was dominated by tertiary education level (28.54%) and bachelor degrees or equivalent level (27.02%).

In 2022, after COVID-19 the employment status shows an increase by 1.21% for self-own worker, and 2.11% increase as unpaid/family workers. The industry sector for married women experienced a decline in the agricultural sector by 1.15% and experienced the highest increase in the Provision of Accommodation and Food and Drink by 0.92% and the Wholesale and Retail Trade; Car Repair and Maintenance sector by 0.32%.

Based on marital status, average income for women workers showing that single women had relatively higher income than married, and divorce/widowed women. Figure 2 represents the transition from 2019 to 2021, single women experience 5.46% income decline while married women decreased by 12.08%, and divorce/widowed women losing their income by 14.12%. In line with the relaxation of social restrictions, in 2022, the average income based on marital status showing an improvement, especially for single women. Meanwhile for married women the improvement still far below the pre-COVID condition.

Figure 2

Women's Average Adjusted Income by Marital Status



Note. Author's own

4.2.3 Overwork

Characteristic of overwork women in Indonesia in 2019, comes from employees status 37.39%, self own worker with 26.04% and employer assisted by temporary workers/unpaid worker with 19.41%. Meanwhile, non overworked women dominated by employees 40.70%, self own 17.74% and unpaid/family worker 25.33%.

Concentration of overworked women was observed in specific sectors, notably Wholesale and Retail Trade and Car Repair and Maintenance (44.18%) Provision of Accommodation and Food and Drink (17.10%) and Processing Industry (12.31%). Different setting for non overwork women which concentrated in Agriculture, Forestry and Fisheries (27.28%), Processing Industry 18.17% and Wholesale and Retail Trade and Car Repair and Maintenance (18.57%).

Based on education level, 35.87% overwork women was had primary education or less with only 10.86% from bachelor degree level. Non overwork women in contrast has higher bachelor degree percentage with 18.64%, eventhough the primary education level was also high (37%). The majority of overwork women, 64.63% are from urban area.

Following the onset of the COVID-19 pandemic, overworked women with more than 50 hours per week experienced a decline. For those who are still working, the number of overworked with employees status from 2019 was 26.04%, increasing by 4.94% in 2022 to 30.98%. The highest increase came from women who work in Provision of Accommodation and Food and Drink sector from 17.10% in 2019 rising by 1.9% to 19% in 2022.

Figure 3 shows that before COVID-19, the trend average income was increasing from time to time and overwork women has higher income. The hardest downturn was from 2019 to 2021,

average income loss for overwork women reached 18.3% while non overworked women decline 8.74%.

Figure 3

Women's Average Adjusted Income by Overwork Status

Note. Author's own

4.2.4 Education

In Indonesia, the women workers is primarily characterized holding primary educational level. As of 2019, from Figure 4 indicates that 36.75% of women had completed primary education, while the lowest proportion, 10.40% had vocational degree.

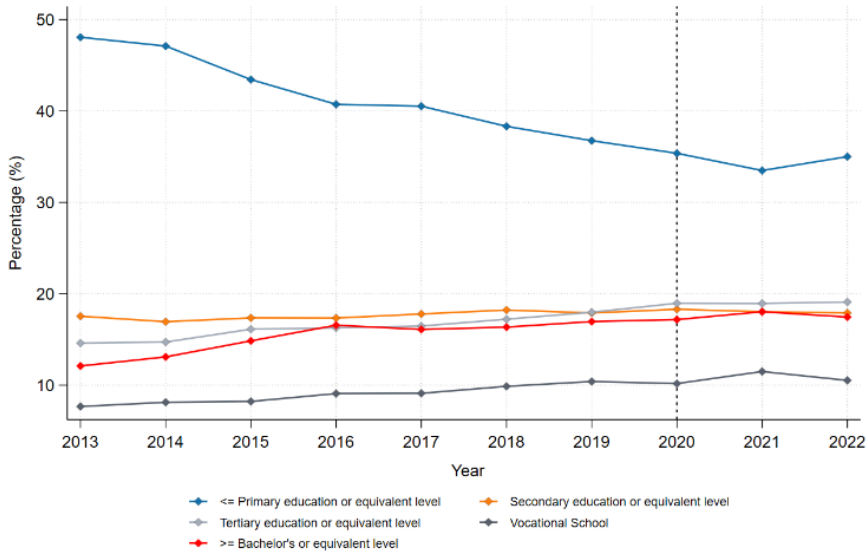
The percentage of women workers with primary education has decreased progressively in the last 10 years. This shift suggests that women are pursuing education beyond the primary level. However, higher level of education were increasing at a very slow pace, indicating Indonesian education still faces challenges. With the patriarchal culture in Indonesia women often find it challenging to finish their education and find jobs that pay well due to socioeconomic problems

such as poverty, early marriage, and a lack of support from family and society. They are forced to work in the informal sector, which often doesn't provide with social security, legal protection, or employment opportunity.

This evolving educational landscape point out the importance of addressing the educational needs of women workers to promote their long-term economic empowerment. Additionally, policies and initiatives that support continuous efforts to ensure higher level educational opportunities are accessible and equitable for all women can play a crucial role in enhancing the skills and employability of women in the labor market.

Figure 4

Percentage of Women's Worker by Education Level



Note. Author's own

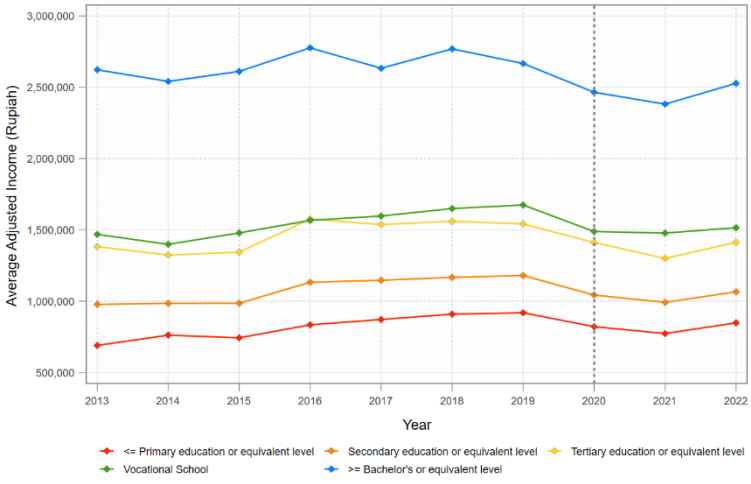
Overview from 2019 condition, the distribution of women in industry sectors varies significantly based on their level of education, with notable distinctions. Among women with bachelor's degrees, they are spread across various sectors such as Education Services (38.74%),

Health Services and Social Activities (13.47%), Wholesale and Retail Trade; Car Repair, and Maintenance (11.99%), and Government Administration, Defense and Social Security (11.45%). In contrast, women without bachelor's degrees tend to be segmented in specific fields, primarily in Agriculture sector (27.16%), Wholesale and Retail Trade; Car Repair and Maintenance (26.57%), and the Processing Industry (19.26%).

In Figure 5, from 2019 to 2020, the trend in the average income of women workers has a wide gap between the bachelor degree level and non bachelor degree level. On average, women holding bachelor's degrees earn approximately Rp. 2,500,000, while those without bachelor's degrees earn around Rp. 1,500,000 or less. Women in Indonesia who have lower levels of education tend to have lower income because they are more engaged in the informal sector. This observation is supported by data from Statistics Indonesia (2022b), which indicates that only 35.57% of women work in the formal sector.

Figure 5

Women's Average Adjusted Income by Education Level



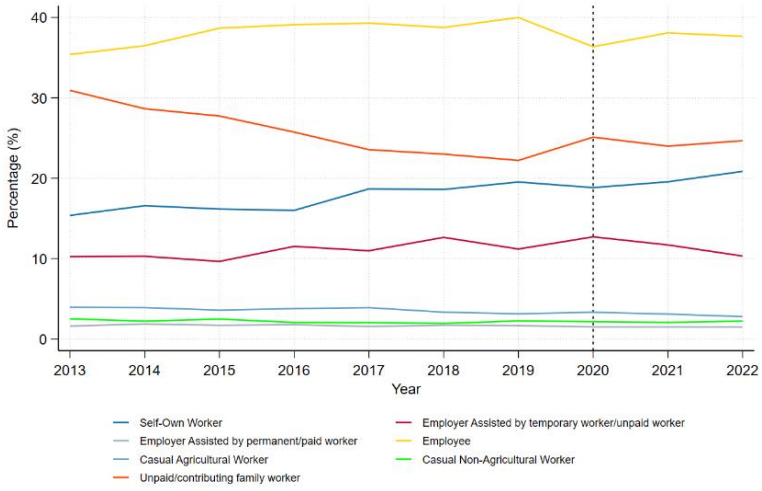
Note. Author's own

4.2.5 Employment Status

In Figure 6, before COVID-19, the proportion of women employees reached 39.99% in 2019 but it declined to 36.36% in 2020 and until 2022 it is still lower than the condition before COVID-19 with 37.66%. Highlight from the employment status, women employees who got laid off from their jobs are likely to shift as unpaid/family workers and self-own workers. From seven categories of employment status, the percentage for self-own workers and unpaid family workers increased after the COVID-19 outbreak, a contrast different with other employment statuses. Self-own workers increased from 19.53 % in 2019 to 20.85% in 2022 and unpaid workers increased from 22.22% in 2019 to 24.67 % in 2022, in line with the previous research which argues that women are vulnerable to exiting the labor market when it comes to COVID-19 outbreak.

Figure 6

Percentage of Women's Worker by Employment Status



Note. Author's own

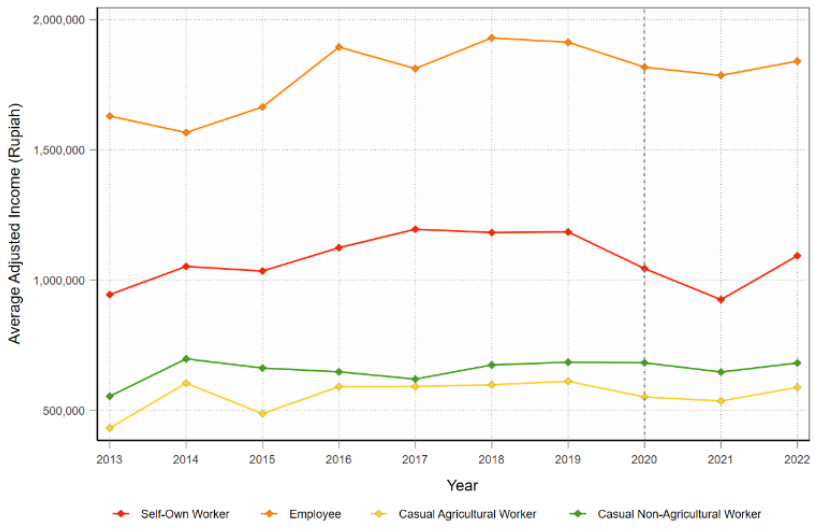
Examination of women average income by employment status in Figure 7 raises the issue that women with self-employed workers status are the ones who experience greater income loss due to

COVID-19. On average their income decreased by 11.87% from 2019 to 2020 and worsen in 2021, yet the employees income mildly decline by 5%.

Following the majority of working women in Indonesia work as self-own workers and employees, the discussion will focus on these two groups. Even though unpaid/family workers also dominated, their income was not covered.

Figure 7

Women's Average Adjusted Income by Employment Status



Note. Author's own

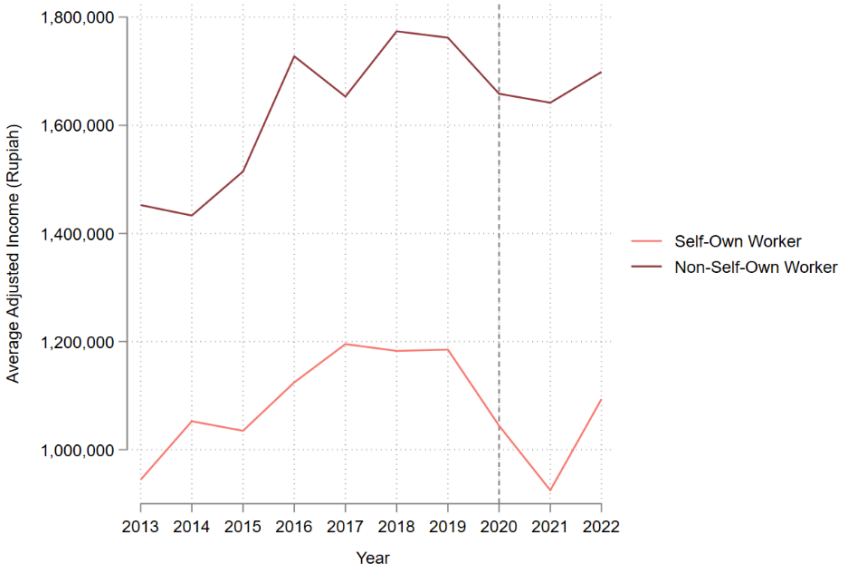
Self Employed

In terms of educational attainment among women as self-own worker, primary education dominates with 43.69% in 2019, while the lowest level of educational attainment is a bachelor's degree, accounting for only 5.80%. Figure 8 illustrates that female self-own worker experience a substantial income decline between 2019 to 2021, their income decreased by 21.95%. In contrast, non-self-own workers, including employees, casual agricultural laborers, and non-casual

agricultural laborers, experienced a more modest decrease of 6.83%. Self-own workers are notably concentrated within the sectors of Wholesale and Retail Trade; Car Repair and Maintenance (44.75%), Processing Industry (16.74%), and Provision of Accommodation and Food and Beverage (16.70%).

Figure 8

Women Average Adjusted Income by Self-Own Worker Status



Note. Author's own

Employees

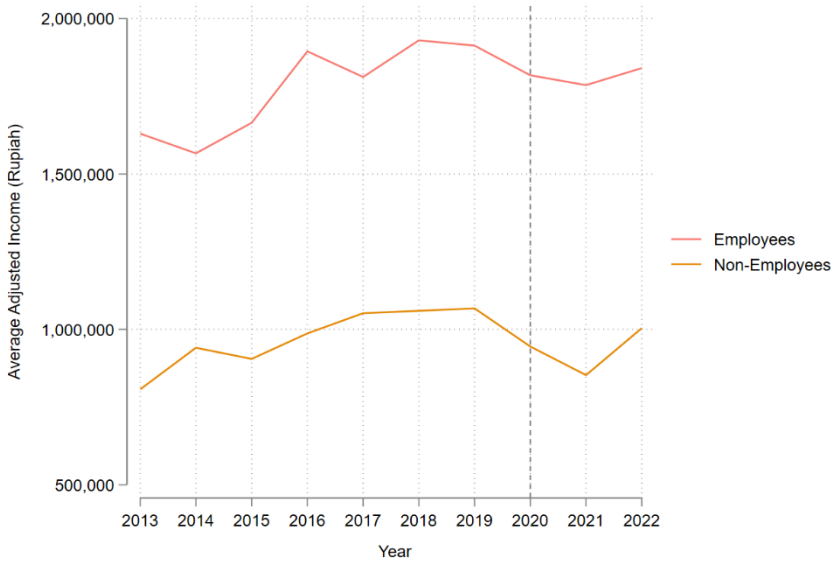
In 2019, the status of women as employees predominated in sectors Processing Industry (22.93%), education services (20.67%), and Wholesale and Retail Trade; Car Repair and Maintenance (13.58%). Educational attainment among women as employees is more evenly distributed across different levels, with the majority holding a bachelor's degree, 35.63%.

From Figure 9, after COVID-19 women as employees experienced a comparatively milder decrease in income compared to other employment statuses, with a 6.65% decline from 2019 to

2021. Meanwhile, non-employees worker including self-own worker, agricultural laborers, and non-agricultural workers, faced a substantial decline of 20.11%.

Figure 9

Women Average Adjusted Income by Employees Status



Note. Author's own

4.2 Empirical Analysis

Empirical result in column (1) Table 3 represent women workers as Head of the Household (HHH) has a negative relationship and significantly affecting the income. Furthermore, from the interaction between Head of the Household (HHH) status and year as a continuous variable, the estimator suggesting that women as Head of the Household (HHH) for every year has a positive effect but doesn't contribute to significant decrease in income. Interestingly, the second interaction between Head of the Household (HHH) status and *COVIDyear* as a dummy variable is also positively related but doesn't have a significant impact on women's income.

The findings diverge from earlier research conducted by Kowalewska and Vitali (2021) and Sauqi et al. (2022), both of which suggested that Head of Household (HHH) women were at a higher risk of experiencing income loss due to the COVID-19 pandemic. However, a closer examination of the unique context of women HHH in Indonesia from the descriptive statistics 4.2.1 sheds light on why their income was not significantly affected by the pandemic.

Firstly, the women HHH in Indonesia is predominantly had low level of education. They are mainly employed in the Agriculture, Forestry, and Fisheries sectors, which were less severely impacted by the large-scale social restrictions imposed during the pandemic.

Secondly, a noticeable pattern emerged as many HHH women who lost their jobs pivoted towards entrepreneurship. They shift their roles as self-employed workers, employers with the assistance of temporary or unpaid workers, and employers with the support of permanent or paid workers in order to sustain their livelihoods. This shift was particularly pronounced due to the fact that a significant portion of women in Indonesia are divorced/widowed, who doesn't have a partner to financially support their household. This argument is supported by research conducted by Tasmilah (2022), which posits that women's status as household heads decreases the probability of them discontinuing their participation in the labor market.

Regression analysis in column (2) represent the effect of marital status on the income after COVID-19. The estimated coefficient of *Married*Year* is -13,728 which means that women who are married every year experience in the income decline by Rp. 13,728. In addition, the coefficient of Married**COVIDyear* is -50,998, indicate a negative relation on the income decline of women workers after COVID-19 by Rp. 50,998 and highly significant at 1% and 5% confidence level. Standard error clustered at the provincial code level reflects the 95 percent confidence level.

This result align with the prior research, which assert that married women are more vulnerable to experiencing more profound repercussions in the aftermath of the COVID-19 pandemic (Alon et al., 2020; Abraham et al., 2022). In a family setting where women have a partner, those who lose their jobs are often compelled to take on more domestic responsibilites or helping their family businesses as an unpaid workers to minimize the expense of their household. as explained in point 4.2.2., Additionally, the notable rise in women workers within the Provision of Accommodation and Food and Drink sector primarily results from women transitioning into unpaid or family work roles.

The prevailing patriarchal cultural norms in Indonesia traditionally place significant share of domestic responsibilities and childcare on women without an equitable contribution from their spouses. Married women who continue to earn income are more likely to opt for jobs with flexible working hours. Parallels with the increasing trend in married women who work in the Provision of Accommodation and Food and Drink sectors, as mention in section 4.2.2. Married women who work in this sector mostly have their own businesses, they become the self-own worker, allowing them the flexibility to determine their own working hours.

The finding in Table 3 column (3) estimates the impact of overwork before and after COVID-19. The coefficient of *overwork* showing that women workers that work more than 50 hours per week has a negative impact on income and significant at 1% and 5% confidence level. The coefficient of *Overwork*Year* is 22,972 which can be interpret women workers who work more than 50 hours per week for every increase in year, they are experiencing income increase by Rp. 22,972 and significant in 1% and 5% confidence level. The interaction between *Overwork*Covid*$_{Year}$ is -106,701 represent in 1% and 5% confidence level, women who work more than 50 hours per week after COVID-19 more likely to lose their income by Rp. 106,701.

Following the insights presented in section 4.2.3, the group of overworked women is primarily dominated by low education, particularly those engaged in the Provision of Accommodation and Food and Beverage sectors. In this sector, there has been a notable rise in self-employment, and these individuals are struggling with the implementation of social restrictions. Especially in the urban area, they find themselves in a situation where they working for longer hours but achieving less favorable results compared to the pre-COVID conditions.

Regression result in column (4) exhibits the effect of women's education level and the condition after COVID-19 on income. Education level of women represent as *Univ*, dummy variable with bachelor degrees or equivalent. The estimator of *Univ* suggest that overall, highly educated women has a positive relation and contribute to the increase in income with 5% confidence level. Highly educated women with bachelor degrees or equivalent experience Rp. 20,623 decrease in income for every increase in year and it is significant in 10% confidence level. Moreover, highly educated women with bachelor degrees or equivalent after COVID-19 experience lower income by Rp. 75,024 than non-educated women and it is significant in 10% confidence level.

As discussed in section 4.2.4, a substantial number of highly educated women in Indonesia are employed in the education services sector, accounting for 38.74%, with a notable presence in the government sector as well. However, during the COVID-19 pandemic, activities that necessitate in-person interaction and large gatherings became a significant factor contributing to reduced income for highly educated women. The shift to online education and the impact on private educational institutions became evident.

According to a report from Merdeka.com (2020), around 646,200 schools from early childhood education to tertiary levels education were forced to close in 2020 due to the pandemic.

This posed a significant challenge for those who are still employed in the education sector. Their income declined justified by the sharp decrease in demand from the public, particularly for informal education such as early childhood education. In a household where the parents working remotely from home, the responsibility for childcare and education shifted to the parents.

Apart from that, a special case in the capital city of Indonesia, DKI Jakarta where the governor's implement the policy to cut 50% of intensives for civil servants during April–December 2020, except for health and support workers who handle COVID-19. It also can be one of the factors that influences the decline in income for women with bachelor degree level given the proportion of highly educated women who work in Government Administration Defense and Social Security counted to 10.39% in 2022.

Derived from equation model (5) in chapter 3, the findings from Table 2 column (5) expose that women who work as self-employed positively related impacting women's income and significant at 5% confidence level. The coefficient of interest from '*Self_employed*Year'* describe self-employed women for every increase in year had Rp 16,172 lower income than non-self-employed women and it is significant at 5% confidence level. Similar pattern was shown from the interaction between *Self_employed* with the $COVID_{Year}$, self employed women after COVID-19 had lower income by Rp 48,078 and significant in 5% confidence level. Confirming the substantial decline in the average income of self-own worker women discussed in section 4.2.5.

Although there has been a surge in the number of women as self-own worker in the post-pandemic period, it doesn't necessarily leads to higher incomes. The presents challenges for newly established small businesses are to find their customer because the consequence of social restrictions brings economic hardships and diminishing the purchasing power of consumers.

In 2020, government implement the National Economic Recovery Program (PEN) targeting the vulnerable group like poor people, and also provides assistance for micro and small entrepreneurs such as cash assistance for street vendors and small kiosks, the funds for the expansion and restructuring of MSME loans, Community Business Loan (KUR) and many other incentives. It has bring a positive impact on maintaining the purchasing power and the preserve the existence of self-own worker.

Lastly, the regression in column (6) investigate the effect of women employee status on income. Interaction between employee status for every year increase has Rp. 15,178 higher in income than non-employee status and significant at 5% confidence level. The coefficient of $Employees*Covid_{Year}$ is 9,385 which point out that employees after COVID-19 not significantly associate with income decline. The finding was in line with the description of the average income trend in section 4.2.6 where women as employees only experience a mild decrease after COVID-19.

The overall result in Table 3 shows that women workers income shown a positive increase every year as their age, and education level increase. Furthermore, this study examines the effect of COVID-19 on income through $COVID_{Year}$ variable which was count in all the regression model. The estimated coefficient of $COVID_{Year}$ obtained accross all models are negative and significant, implying that women workers more likely to experience income decline after COVID-19 but the effect is varies between categories.

Table 3

Regression Result of the Impact of COVID-19 on Women's Income

		Adjusted Income	
VARIABLES	(1)	(2)	(3)
HHH	-1.441e+06		
	(1.036e+07)		
HHH*Year	698.9		
	(5,137)		
HHH*$Covid_{Year}$	345.4		
	(20,424)		
Married		2.769e+07***	
		(9.252e+06)	
Married*Year		-13,728***	
		(4,590)	
Married*$Covid_{Year}$		-50,998***	
		(17,845)	
Overwork			-4.616e+07***
			(7.064e+06)
Overwork*Year			22,972***
			(3,496)
Overwork*$Covid_{Year}$			-106,701***
			(14,732)
Age	11,911***	11,539***	11,629***
	(2,515)	(2,691)	(2,729)
$Covid_{Year}$	-260,683***	-227,021***	-230,003***
	(35,425)	(38,909)	(37,542)
Year	41,251***	50,399***	35,467***
	(8,558)	(9,828)	(8,381)
Univ	1.469e+06***	1.469e+06***	1.492e+06***
	(108,301)	(108,459)	(106,704)
Married	-33,935		-17,069
	(35,621)		(31,638)
Constant	-8.243e+07***	-1.009e+08***	-7.081e+07***
	(1.721e+07)	(1.978e+07)	(1.684e+07)
Weighted Observations	264,890,998	264,890,998	264,890,998
Actual Observation	762,012	762,012	762,012
R-squared	0.197	0.197	0.198

Standard error clustered at the provincial code level are in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Regression Result of the Impact of COVID-19 on Women's Income

	Adjusted Income		
VARIABLES	(4)	(5)	(6)
Univ	4.311e+07**		
	(2.076e+07)		
Univ*Year	-20,623*		
	(10,337)		
Univ*$Covid_{Year}$	-75,024*		
	(44,102)		
Self_employed		3.242e+07**	
		(1.326e+07)	
Self_employed*Year		-16,172**	
		(6,580)	
Self_employed*$Covid_{Year}$		-48,078**	
		(21,337)	
Employees			-3.014e+07**
			(1.247e+07)
Employees*Year			15,178**
			(6,194)
Employees*$Covid_{Year}$			9,385
			(21,441)
Age	11,487***	13,394***	17,206***
	(2,689)	(2,710)	(2,211)
$Covid_{Year}$	-238,714***	-243,057***	-257,833***
	(28,859)	(37,527)	(32,124)
Year	45,466***	47,221***	32,727***
	(6,328)	(9,919)	(5,298)
Univ		1.402e+06***	1.274e+06***
		(108,324)	(106,103)
Married	-23,285	-4,929	20,700
	(30,551)	(29,180)	(25,801)
Constant	-9.094e+07***	-9.447e+07***	-6.572e+07***
	(1.271e+07)	(1.994e+07)	(1.068e+07)
Weighted Observations	264,890,998	264,890,998	264,890,998
Actual Observation	762,012	762,012	762,012
R-squared	0.197	0.200	0.212

Standard error clustered at the provincial code level are in parentheses

*** p<0.01, ** p<0.05, * p<0.1

V. CONCLUSION

This paper has furthered our understanding of the income distribution of women and broadened the scope of the investigation into the impact of COVID-19 on women's income in Indonesia with adjusting the income using the Consumer Price index (CPI). In this study, empirical analysis was carried out using the regression analysis approach. Data are collected from Statistics Indonesia for the period 2013 to 2022 for all variables. The variables used in this research are year of COVID-19, women's status in the household, marital status, overwork, education level and employment status on income. In this thesis, it fostered the idea that the COVID-19 pandemic might have a detrimental impact on women's income distribution in Indonesia. The outcome provide in this paper are important because they present evidence of COVID-19 substantial influence on women's income distribution, and identify the current transition of women's workers following the COVID-19 outbreak.

After carrying out an empirical examination, the primary findings point out that the COVID-19 years significantly impacting the women's income. Overall, the research indicates that women workers in Indonesia more likely to experience an increasing trend in income over the years.

The regression analysis estimates a reduction in the income of women after COVID-19 by Rp. 260,683 on average. Women status as the Head of the Household (HHH) showing no evidence impacting the income after COVID-19. Given that the majority of women HHH are divorced/widowed, they don't have partner to support them financially. Resulting they are more resistance to the pandemic and stay in the labor market to work and earn income for their household. This finding corresponds to research by Tasmilah (2022) which claim that women's status as head of the household reduces the likelihood for them to exit from the labor market.

Second, the impact of marital status on income after COVID-19 reveals that married women more likely to experience a decline in income, with a substantial drop Rp. 50,998. Married women facing more severe effect, particularly women who have toddlers (Tasmilah, 2022). With the implementation of online schooling during COVID, it forces women to change their roles and adjust their working hours or give up the chance to rejoin the workforce.

Third, delves into the effects of overworked women, after COVID-19 it is associated with a significant negative impact with Rp. 106,701 loss in the average income. The number of overworked women increased significantly in the provision of accommodation and food and drink sector, both in urban and rural areas. The rising number of overworked women was particularly prominent among self-own workers in provision of accommodation and food and drink sector.

Fourth, highly educated women, with bachelor degrees or equivalent, show a positive relationship with income. However, after COVID-19, women with bachelor degrees or equivalent level experience a significant income decrease compared to low educated women. Women with bachelor degrees or equivalent mostly works in the service sectors such as Education Services; Government Administration, Defense and Social Security which has been disproportionately affected by COVID-19 because their activities involving direct contact with people. Except for Health Services and Social Activities which experience the opposite because they become the frontliner in handling the pandemic.

Fifth, after COVID-19, self-employed women more likely to experience income decline by Rp. 48,078 than non self-employed women. Linked with the overworked women, many women as self-employment involved in provision of accommodation and food and drink sector, often starting their micro, small-scale food and drink businesses with limited capital. For those who persisted during COVID-19, they also felt the impact of decreasing income because the social

restriction that was posed. Self own worker in the provision of accommodation and food and drink sector tends to be more uncertain when compared to more formal sectors, they work longer but earn less.

Lastly, this study examines the effect of women status as employees on income after COVID-19. Being an employee is positively related to income, with a notable increase for each additional year. However, after COVID-19, employee status does not significantly associate with income decline. It may support the finding from Tasmilah (2022) which claim women status as employees reducing their probability to exit from labor market.

The findings has addressed the the primary hypotheses of this study and consistent with the previous research. Contrary with the previous research, one key finding in this study doesn't showing women status as head of the household impacting their income after COVID-19. I found that women as head of the household were dominated by divorced and widowed women who are more involve in the agricultural sector which not affected much by the COVID-19.

Government efforts to recover from COVID-19 effect through the National Economic Recovery Program (PEN) have contributed to keep women self own worker to survive during COVID-19. However, this support has yet to yield substantial improvements for their income. Overall, the result points out that after COVID-19, women's income distribution is decreasing and still not recoup the condition before COVID-19. While the impact may not be large on average, it can still have significant consequences for women in the specific subgroups in the long term considering the significant increase in the contribution of women to supporting household economy.

5.1 Policy Implication

The points raised previously emphasize the corresponding policy implications:

1. **Prepare for the Long-Term Economic Resiliency**

Our study observed women's income distribution after COVID-19 has surpassed its critical period and slowly shows a trend toward recovery. To recoup the loss after COVID-19, the government should be responsive to the changes in the structure of women workers in the labor market. Setting up policies which in line with current conditions, can bring a progressive improvement in women's economy, and household economy, and also contribute to the country's economy. The shifting of women workers from employees to self-owned workers which is considered to be a more flexible job in terms of working hours is a big opportunity to maximize the women's empowerment program for Micro Small Medium Enterprise (MSME) Businesses, especially in the urban area that disproportionate affected by COVID-19.

The increasing number of self-owned workers after COVID-19 shows women are more resilient in finding alternative employment or income sources during this period. Government support for women's self-owned businesses especially for entrepreneurs in the provision of accommodation and food and drink sector can be conducted by providing women entrepreneurship training by utilizing the economic potential of each region. Integrating the use of digital technology to enhance the resilience of women’s businesses in the era of Industry 4.0 can also develop and sustain long-term women’s economic productivity. Lastly, the main factor in supporting women's self-owned businesses was by giving them incentives like business capital assistance to start their businesses as entrepreneurs.

2. **Financial Skills Training for Women**

Women workers are mostly involved in the informal sector which is dominated by micro and small businesses. Setting up financial skills training for women is necessary to ensure the continuing existence of their self-owned businesses. From this study, the majority of women workers in Indonesia only completed primary education. Furthermore, women also face barriers to accessing digital technology to transform their business into a digital platform like e-commerce. Having a low level of education does not mean that women can't do business, by obtaining the financial skills and getting consistence assistance, they still have a chance to succeed. Financial skills training can support women in managing their business financing.

3. **Equality in the Workplace**

This study observed the income gap between women and men has widened over the past 10 years. The income disparity raised our concern because unexpectedly it narrowed down in the first two years of COVID-19, in 2020 and 2021. However, in 2022, the gap widened and reached a higher point than before COVID-19. This finding suggests that women's income contribution during COVID had become a major influence in narrowing the gap. Policy implications need to encourage businesses and institutions to adopt gender equality programs within their workplaces. These programs may include policies to address the gender pay gap, provide family-friendly work arrangements, etc. To overcome the gender job segregation within the country, which has been a long-term effort even long before COVID-19, practical policies that support a more egalitarian society like sharing housework responsibilities, and childcare arrangements with their spouse would persuade women to return to labor market and can be a positive impact on productivity and other social benefits.

4. **Gender-Responsive Disaster Management**

Incorporate gender considerations into disaster preparedness and response policies. Recognize that disasters can affect women and men differently, and plan accordingly to ensure the safety and well-being of all community members. A report from UNICEF and SMERU (2021) claims that 51.5% of households they interviewed do not have any savings to fall back on in emergencies situation. Creating a more resilient household financial is needed by collaborating with the local financial institution and doing the campaign. Facilitate women to create savings accounts even in a small amount of money, flexible savings options where they can withdraw their money also be a part of the policy implication. This can encourage women's independence and endurance in dealing with unforeseen challenges.

5. **Strengthen Social Safety Nets for Vulnerable Groups**

Women aged 45+ years who live in urban areas are greatly affected by the loss of income and still no signs of improvement until 2022. The substantial steps to reduce the social insecurity problem in the household, the government can give assistancy in the form of a social safety net. For a long-term recovery, equip this group of women with micro-scale entrepreneurial skills through collaboration with local communities so that they can remain productive at an age that is considered unproductive.

5.2 Limitation

In this study, I'm using the data from the National Labor Force Survey which measures income. Despite the fact that this study was utilize a large sample observation, the limitation of this study is I encompasses both urban and rural areas, which may exhibit different impact given the social restriction was posed strictly in urban area. In that sense, additional treatment should be

done for the future research to build more robust analysis by conducting more in-depth analysis on specific rural and urban contexts and introduce additional variables, such as the number of children, access to internet, access to workplace, and household members to enhance the robustness of findings from the head of the household status or marital status.

REFERENCES

Abraham, R., Basole, A., & Kesar, S. (2022). Down and out? The gendered impact of the Covid-19 pandemic on India's labour market. Economia Politica, 39(1), 101–128. https://doi.org/10.1007/s40888-021-00234-8

Adams-Prassl, A., Boneva, T., Golin, M., & Rauh, C. (2020). *Inequality in the Impact of the Coronavirus Shock: Evidence from Real Time Surveys.*

Akalu, L. S., & Wang, H. (2023). Does the female-headed household suffer more than the male-headed from Covid-19 impact on food security? Evidence from Ethiopia. Journal of Agriculture and Food Research, 12, 100563. https://doi.org/10.1016/j.jafr.2023.100563

Alon, T., Doepke, M., Olmstead-Rumsey, J., & Tertilt, M. (2020). *The Impact of COVID-19 on Gender Equality* (w26947; p. w26947). National Bureau of Economic Research. https://doi.org/10.3386/w26947

Casale, D., & Posel, D. (2020). Gender and the early effects of the COVID-19 crisis in the paid and unpaid economies in South Africa. *National Income Dynamics (NIDS)-Coronavirus Rapid Mobile Survey (CRAM) Wave, 1*.

Casale, D., & Shepherd, D. (2020). *The gendered effects of the ongoing lockdown and school closures in South Africa: Evidence from NIDS-CRAM waves 1 and 2*. Department of Economics, University of Stellenbosch.

Cha, Y. (2013). Overwork and the Persistence of Gender Segregation in Occupations. *Gender & Society, 27*(2), 158–184. https://doi.org/10.1177/0891243212470510

Cortes, P., & Pan, J. (2017). Cross-Country Evidence on the Relationship between Overwork and Skilled Women's Job Choices. *American Economic Review, 107*(5), 105–109. https://doi.org/10.1257/aer.p20171064

Dang, H.-A. H., & Viet Nguyen, C. (2021). Gender inequality during the COVID-19 pandemic: Income, expenditure, savings, and job loss. *World Development, 140,* 105296. https://doi.org/10.1016/j.worlddev.2020.105296

Farida, L. (2011). Kontribusi pendapatan perempuan bekerja sektor informal pada ekonomi keluarga di kota Pekanbaru [Contribution of women's income working in the informal sector to the family economy in the city of Pekanbaru]. *Jurnal Aplikasi Bisnis*, *1*(2).

Gibson, J., & Olivia, S. (2020). Direct and indirect effects of COVID-19 on life expectancy and poverty in Indonesia. *Bulletin of Indonesian Economic Studies, 56*(3), 325-344

Goldin, Claudia. (2022). *Understanding the economic impact of COVID-19 on women* (Working Paper 29974). National Bureau of Economic Research. https://www.nber.org/papers/w29974

Graeber, D., Kritikos, A. S., & Seebauer, J. (2021). COVID-19: A crisis of the female self-employed. *Journal of Population Economics, 34*(4), 1141–1187. https://doi.org/10.1007/s00148-021-00849-y

Ham, S. (2021). Explaining Gender Gaps in the South Korean Labor Market During the COVID-19 Pandemic. *Feminist Economics, 27*(1–2), 133–151. https://doi.org/10.1080/13545701.2021.1876902

ILO. (2021, August 21). *COVID-19 and the ASEAN labour market: Impact and policy response*. https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/briefing note/wcms_816432.pdf

Jones, L. E., Manuelli, R. E., & McGrattan, E. R. (2015). WHY ARE MARRIED WOMEN WORKING SO MUCH? Journal of Demographic Economics, *81*(1), 75–114. https://doi.org/10.1017/dem.2014.7

Kalenkoski, C. M., & Pabilonia, S. W. (2022). Impacts of COVID-19 on the self-employed. *Small Business Economics*, *58*(2), 741–768. https://doi.org/10.1007/s11187-021-00522-4

Kalyanpur, A., Thomas, D., Wu, D., Tashjian, L., Sifuentes, M. D., & Hall, R. Rapid gender analysis-COVID-19 : COVID-19 in the United States. Care. United States-July, 2020. https://www.care.org/wp-content/uploads/2020/07/7.8.2020-USA-RGA.pdf

Kansiime, M. K., Tambo, J. A., Mugambi, I., Bundi, M., Kara, A., & Owuor, C. (2021). COVID-19 implications on household income and food security in Kenya and Uganda: Findings from a rapid assessment. *World Development*, *137*, 105199. https://doi.org/10.1016/j.worlddev.2020.105199

Kargi, B. (2014). Labor force participation rate and economic growth: observations for Turkey. *Universal Journal of Management and Social Sciences*, *4*(4), 46-54.

Klasen, S. & Lamanna, F. (2009). The impact of gender inequality in education and employment on economic growth: New evidence for a panel of countries. *Feminist Economics*, *15*(3), 91-132. https://doi.org/10.1080/13545700902893106

Kowalewska, H., & Vitali, A. (2021). Breadwinning or on the breadline? female breadwinners' economic characteristics across 20 welfare states. *Journal of European Social Policy, 31*(2), 125-142.

Kristal, T., & Yaish, M. (2020). Does the coronavirus pandemic level the gender inequality curve? (It doesn't). *Research in Social Stratification and Mobility, 68*, 100520. https://doi.org/10.1016/j.rssm.2020.100520

Kugler, M., Viollaz, M., Duque, D., Gaddis, I., Newhouse, D., Palacios-Lopez, A., & Weber, M. (2023). How did the COVID-19 crisis affect different types of workers in the developing world? *World Development, 170*, 106331. https://doi.org/10.1016/j.worlddev.2023.106331

Madgavkar, A., White, O., Krishnan, M., Mahajan, D., & Azcue, X. (2020). COVID-19 and gender equality: Countering the regressive effects. McKinsey Insights, N.PAG.

Merdeka.com (2020). Ministry of Education and Culture Records 646,200 Schools Closed Due to Corona Virus [Kemendikbud Catat 646.200 Sekolah Tutup Akibat Virus Corona]. Retrieved from https://www.merdeka.com/uang/kemendikbud-catat-646200-sekolah-tutup-akibat-virus-corona.html

Miranti, R., Sulistyaningrum, E., & Mulyaningsih, T. (2022). Women's Roles in the Indonesian Economy during the COVID-19 Pandemic: Understanding the Challenges and Opportunities. *Bulletin of Indonesian Economic Studies*, *58*(2), 109–139. https://doi.org/10.1080/00074918.2022.2105681

Miranti, R., Sulistyaningrum, E., & Mulyaningsih, T. (2022). Women's roles in the Indonesian economy during the COVID-19 pandemic: understanding the challenges and opportunities. *Bulletin of Indonesian Economic Studies*, *58*(2), 109-139.

Nordhues, H. C., Bhagra, A., Stroud, N. N., Vencill, J. A., & Kuhle, C. L. (2021). COVID-19 gender disparities and mitigation recommendations: A narrative review. *Mayo Clinic Proceedings*, *96*(7), 1907–1920. https://doi.org/10.1016/j.mayocp.2021.04.009

Oo, B. L., & Lim, B. T. H. (2021). Changes in job situations for women workforce in construction during the COVID-19 pandemic. *Construction Economics and Building*, *21*(2). https://doi.org/10.5130/AJCEB.v21i2.7526

Putri, Y. E., Amar, S., & Aimon, H. (2015). Analisis faktor-faktor yang mempengaruhi pertumbuhan ekonomi dan ketimpangan pendapatan di Indonesia [Analysis of factors affecting economic growth and income inequality in Indonesia]. *Jurnal Kajian Ekonomi*, 3(6). Available at: https://ejournal.unp.ac.id/index.php/ekonomi/article/view/5348/4227

Ravallion, M. (2014). Income inequality in the developing world. *Science*, *344*(6186), 851–855. https://doi.org/10.1126/science.1251875

Reichelt, M., Makovi, K., & Sargsyan, A. (2021). The impact of COVID-19 on gender inequality in the labor market and gender-role attitudes. *European Societies*, *23*(sup1), S228–S245. https://doi.org/10.1080/14616696.2020.1823010

Sari, E. K., & Fikri Zufar, B. N. (2021). Perempuan pencari nafkah selama pandemi COVID-19 [Women breadwinner during the COVID-19 pandemic]. *Al-Mada: Jurnal Agama, Sosial, dan Budaya*, *4*(1), 13–29. https://doi.org/10.31538/almada.v4i1.1106

Satistics Indonesia. (2023). Consumer price index of 90 cities in Indonesia 2022 (2018=100). Statistics Indonesia

Sauqi, M., Varlitya, C. R., & Siregar, M. I. (2022). Pandemi COVID-19 dan perempuan sebagai kepala rumah tangga dalam kemiskinan urban di kota Banda Aceh [The COVID-19 pandemic and women as heads of households in urban poverty in the city of Banda Aceh]. *Darussalam Journal of Economic Perspectives*. 8.

Statistics Indonesia (n.d). Percentage of formal labor force by gender. https://www.bps.go.id/indicator/6/1170/1/persentase-tenaga-kerja-formal-menurut-jenis-kelamin.html

Statistics of Indonesia. (2022a). Contribution of women's income (percent), 2020-2021. https://www.bps.go.id/indicator/40/467/1/sumbangan-pendapatan-perempuan.html

Statistics of Indonesia. (2022b). Percentage of formal labor according to gender (percent), 2020-2022. https://www.bps.go.id/indicator/6/1170/1/persentase-tenaga-kerja-formal-menurut-jenis-kelamin.html

Tasmilah, T. (2022). Determinan keluarnya perempuan dari pasar tenaga kerja pada masa pandemi COVID-19 [Determinants of women's exit from the labor market during the pandemic].

Todaro, M. (1989). Economic development in the third world. Longman Publishing Group.

UNICEF (United Nations Children's Fund), UNDP (United Nations Development Programme), Prospera (Australia Indonesia Partnership for Economic Development), and SMERU. (2021). Analysis of the social and economic impacts of COVID-19 on households and strategic policy recommendations for Indonesia. Jakarta: UNICEF, UNDP, Prospera, and SMERU.

Wahyuni, R. N. T., & Monika, A. K. (2017). Pengaruh pendidikan terhadap ketimpangan pendapatan tenaga kerja di Indonesia [The influence of education on labor income

inequality in Indonesia]. *Jurnal Kependudukan Indonesia*, 11(1), 15. https://doi.org/10.14203/jki.v11i1.63

Zamarro, G. (2020). *Gender Differences in the Impact of COVID-19*. Retrieved from https://www.ktla.com/wp-content/uploads/sites/4/2020/06/ZamarroGenderDiffImpact COVID-19_061820-2.pdf