

Women's Resilience and Vulnerability in Facing COVID-19 in DKI Jakarta and East Java

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Abstract

Indonesia ranks 23rd as the most COVID-19 confirmed cases in the world. DKI Jakarta and East Java provinces have the highest cases in Indonesia. However, data on the transmission of COVID-19 in both provinces were not further analyzed regarding vulnerability between genders. This research attempted to compare the differences in the gender distribution of COVID-19 cases by analyzing data from COVID-19 DKI Jakarta and East Java Task Force Information Center and various biological, medical, and socio-cultural studies to understand risk of women being exposed to COVID-19. The results of this research revealed that both provinces had a higher number of confirmed patients under surveillance (PDP), people under surveillance (ODP), and death cases in men than that of women. In DKI Jakarta, the number of recovered cases in men was higher than that of women, but in East Java it was not significantly different. Based on literature reviews, women were more resilience in manifestations of COVID-19 severity than that of men due to differences in ACE2 gene distribution and expression, hormones regulations, immune responses, comorbidities, and ages. However, data from socio-cultural literature reviews in both provinces showed women were vulnerable to be exposed to COVID-19 since many women performed as health workers, office workers, market traders, public transportation users, and did religious activities. Besides, women were vulnerable due to mental health condition, such as depression, anxiety, and special medical condition (e.g. being exposed to or infected with COVID-19 during pregnancy).

Keywords: corona virus; Indonesia; gender

Introduction

COVID-19 has several symptomatic and asymptomatic clinical symptoms. In general, the symptoms of COVID-19 are in the form of respiratory symptoms, fever, and body temperature of $>37.5^{\circ}\text{C}$. In critical situations, they potentially lead to death (Polleti et al., 2020). COVID-19 has infected 20,060,607 people and resulted in 734,667 deaths worldwide on August 10, 2020. Indonesia ranks 23rd as the country with the most cases in the world (Worldometers, 2020).

The government of Indonesia announced 104,432 confirmed cases of COVID-19, 4,975 deaths, and 62,138 recovered cases from 473 cities in 34 provinces (Ministry of Health, 2020) on July 29, 2020. Indonesia has prioritized to handle COVID-19 cases in eight provinces, including East Java and DKI Jakarta. Other major cases are in South Sulawesi, Central Java, North Sumatra, West Java, Papua, and South Kalimantan as the positive cases in the regions reach 78% (Tempo, 2020a). Java accounts for the most cases, namely around 57% throughout Indonesia with the highest cases in DKI Jakarta and East Java (National COVID-19 Task Force, 2020). Both have large metropolitan cities in Indonesia.

The cause of the high number of cases in East Java, which became the previous epicenter, could be explained from the survey conducted by the Association of Indonesian Public Health Scholars and Professionals (PERSAKMI) East Java and the Alumni Family Association of the Faculty of Public Health, Universitas Airlangga evaluating the implementation of Large-Scale Social Restrictions (PSBB) in metropolitan Surabaya Raya. The results implied that the population of East Java had a non-compliance rate in using masks (reaching 70%) and around 62% did not apply physical distance when doing activities outside the home (Kumpanan, 2020a). However, the test ratio in East Java ranks fourth in all of

Indonesia (National COVID-19 Task Force, 2020). Unlike East Java, apart from being caused by extensive transmission, Jakarta has the highest test capacity in Indonesia (DKI Jakarta COVID-19 Task Force, 2020).

In addition to various studies, there are differences in biological and medical characteristics between women and men who are at risk of being exposed to COVID-19 due to differences in ACE2 receptor distribution, immune system, special conditions such as pregnancy, psychology and comorbidities. Another socio-culture factors such as the types of jobs, workplaces, and ages need to be taken into account to identify the causes of the high COVID-19 cases between men and women in the two provinces. However, the data presented by DKI Jakarta and East Java were not yet further analyzed regarding resilience and vulnerability between genders based on these factors, especially in women.

This research attempted to compare the differences in gender distribution of COVID-19 cases based on data provided by the local governments of DKI Jakarta and East Java and to examine the biological and socio-cultural factors that influence it. Therefore, it is expected to provide insight for a more precise handling of COVID-19 in Indonesia.

Methodology

This research applied literature review method as the research method studied from various biological studies, medical studies, and mass media to analyze the latest factors that play a role in the COVID-19 transmission and the analysis of quantitative data conducted by Official DKI Jakarta COVID-19 Task Force Information Center <https://corona.jakarta.go.id> and Official East Java COVID-19 Task Force Information Center <http://infocovid19.jatimprov.go.id>. Biological and medical literature reviews were useful for describing the correlation of gene expression, immune conditions,

and clinical conditions between men and women. Meanwhile, socio-cultural literature reviews were useful for describing the correlation between socio-cultural factors, such as the type and distribution of jobs, community, market, and mobility with the risk of being exposed to COVID-19. These data were collected started from 23 June to 31 July, 2020. The quantitative data retrieved from <https://corona.jakarta.go.id> and <http://infocovid19.jatimprov.go.id> present the difference in the number of men and women who were exposed to COVID-19 and analyzed it using Microsoft Excel and SPSS.

Results and Discussion

1. Results of DKI Jakarta and East Java Data Analysis

The data were collected for 11 days, started from 23 June to 7 July, 2020 (no data was collected on 28 and 29 June) to describe the difference in the percentage of confirmed cases, Patients Under Surveillance or *Pasien Dalam Pengawasan* (PDP), People Under Surveillance or *Orang Dalam Pengawasan* (ODP), recovered cases, and death cases both in DKI Jakarta and East Java.

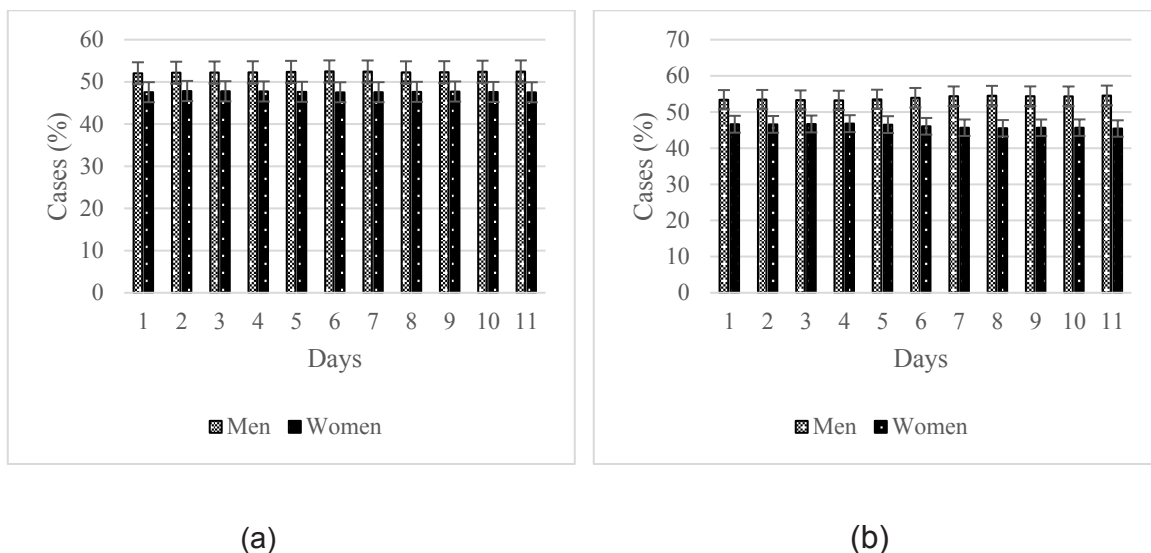


Figure 1. COVID-19 positive cases (a) DKI Jakarta; (b) East Java

The number of confirmed cases in DKI Jakarta as of 7 July, 2020 was 12,725, while in East Java was 14,578. In these two provinces, the percentage of confirmed cases was higher in men than that of women. Based on statistical analysis with p value <0.05 , there was a significant difference on confirmed cases between men and women in the two provinces. In DKI Jakarta, the highest

percentage of men cases occurred on the 6th day (52.47%), while the highest women cases occurred on the 2nd day (47.83%). In East Java, the highest percentage of confirmed cases in men occurred on the 7th day (54.57%), while the highest confirmed cases in women occurred on the 4th day (46.78%).

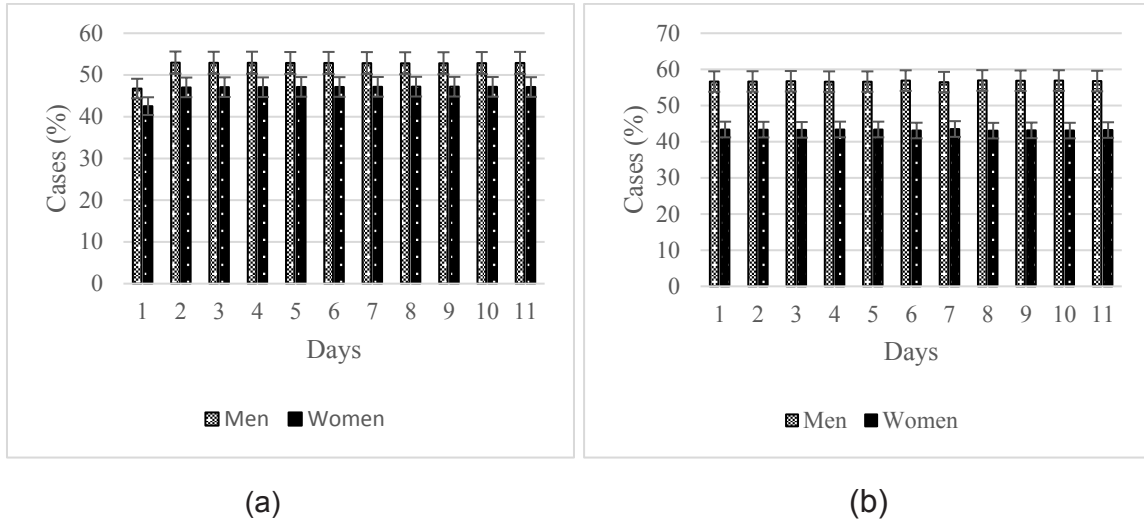


Figure 2. COVID-19 PDP cases (a) DKI Jakarta; (b) East Java

The number of PDP cases in DKI Jakarta as of 7 July, 2020 was 18.435 cases, while in East Java was 11.784 cases. In these two provinces, the percentage of PDP cases was higher in men than that of women. Based on the statistical analysis with p value <0.05 , there was a significant difference on PDP cases between men and women in the two provinces. In DKI Jakarta, the

highest percentage of men cases occurred on the 2nd day (52.97%), while the highest percentage of women PDP cases occurred on the 8th day (47.2%). In East Java, the highest percentage of PDP cases in men occurred on the 8th day (56.94%), while the highest PDP cases in women occurred on the 7th day (43.51%).

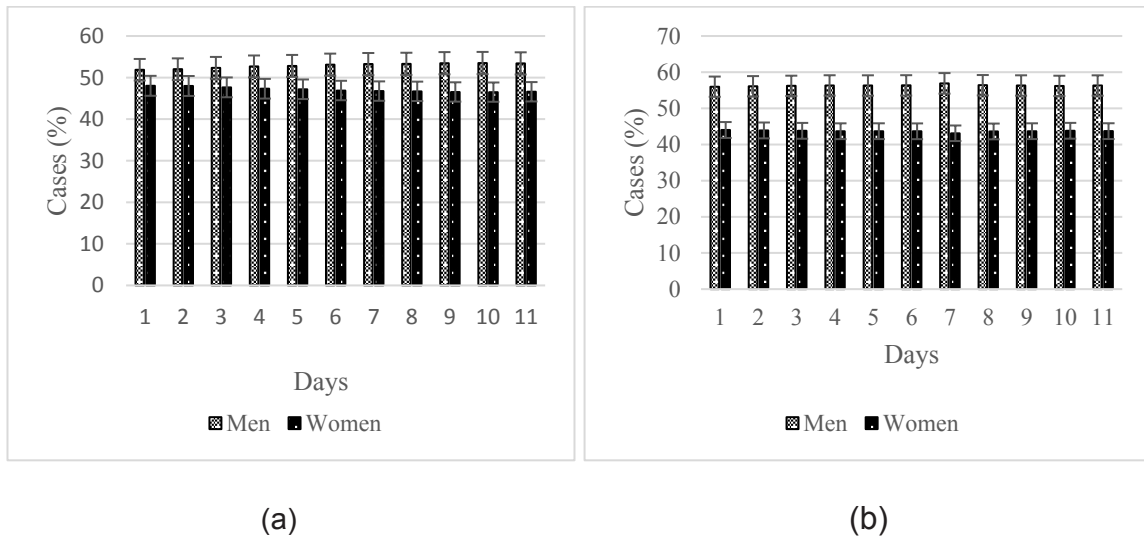


Figure 3. COVID-19 ODP cases (a) DKI Jakarta; (b) East Java

The number of ODP cases in DKI Jakarta as of July 7, 2020 was 101.360 cases, while in East Java was 30.409 cases. In these two provinces, the percentage of ODP cases was higher in men than that of women. Based on the statistical analysis with p value <0.05 , there was a significant difference on ODP cases between men and women in the two provinces. In DKI Jakarta,

the highest percentage of men cases occurred on the 10th day (53.5%), while the highest ODP cases in women occurred on the 1st day (48.02%). In East Java, the highest percentage of ODP cases in men occurred on the 7th day (56.9%), while the highest ODP cases in women occurred on the 1st day (44.01%).

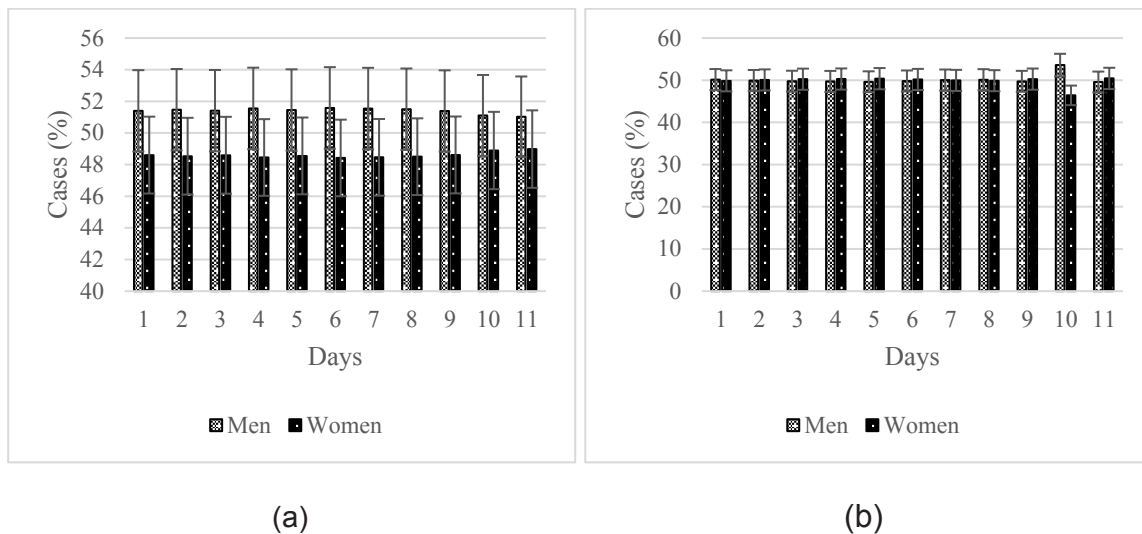


Figure 4. COVID-19 recovered cases (a) DKI Jakarta; (b) East Java

The number of recovered cases in DKI Jakarta as of July 7, 2020 was 8.036 cases, while in East Java was 4.996 cases. In DKI Jakarta province, the percentage of cases recovered was higher in men than that of women. Whereas, in East Java, the recovered cases on day 2, 3, 4, 5, 6, 9, and 11 were higher in women than that of men. Based on the statistical analysis with p value <0.05 , there was a significant difference on recovered cases between men and women in DKI Jakarta, while in East Java there was

no significant difference on recovered cases between men and women. In DKI Jakarta, the highest percentage of the recovered cases in men occurred on the 6th day (51.58%), while the highest percentage of women recovered cases occurred on the 11th day (48.98%). In East Java, the highest percentage of the recovered cases in men occurred on the 10th day (53.59%), while the highest percentage of recovered cases in women occurred on the 11th day (50.43%).

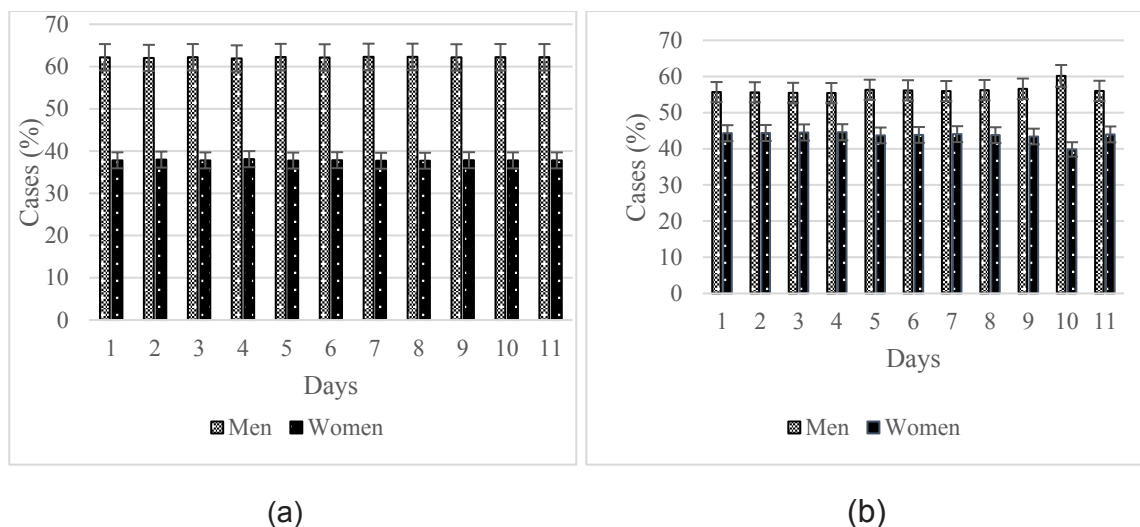


Figure 5. COVID-19 death cases (a) DKI Jakarta; (b) East Java

The number of death cases in DKI Jakarta as of July 7, 2020 was 649 cases, while in East Java was 1.053 cases. In these two provinces, the percentage of death cases was higher in men than that of women. Based on statistical analysis with p value <0.05 , there was a significant difference on death cases between men and women in the two provinces. In DKI Jakarta, the highest percentage of death cases in men occurred on the 7th and 8th day (62.3%), while the highest death cases in women occurred on the 4th day (38.08%). In East Java, the highest percentage of death cases in men occurred on the 10th day (60.17%), while the highest death cases in women occurred on the 4th day (44.58%).

Based on data on <https://corona.jakarta.go.id> regarding the confirmed age, ODP and PDP cases in DKI Jakarta, both men and women were more common at productive ages of 20-29 and 30-39 years old (DKI Jakarta COVID-19 Task Force, 2020). Whereas in East Java, based on data on <http://infocovid19.jatimprov.go.id/>, there were more confirmed cases aged of 40-49 and 50-59 years old both men and women, more PDP cases aged over 60 years old.

Meanwhile, ODP cases were more common at productive ages of 20-29 and 30-39 years (East Java COVID-19 Task Force, 2020).

Based on the analysis above, men were more susceptible to exposure to COVID-19 than that of women. However, the data between the two provinces continue to grow in line with the increase in traceability and the number of tests using PCR as well as other test tools. The tests ratio in Indonesia was very small to get a broad picture of the real conditions in population, especially the real number of men and women who were exposed to COVID-19 (WHO, 2020). Further research is needed to analyze the latest data, especially if there is a lot of clinical data available and accessible from Indonesia.

2. Molecular and Immune Responses Sex Dimorphism

Recent research said there are many fundamental differences in molecular and immune system between men and women as exposed to COVID-19. Following this, this study describes the role of ACE2, TMPRSS2, and the immune system on COVID-19 sex dimorphism.

Angiotensin converting enzyme 2 (ACE2) is a transmembrane monocarboxypeptidase with catalytically active ectodomain. This ectodomain can undergo shedding which results in ACE2 in the circulation (Patel et al., 2013). ACE2 is widely expressed in multiple tissues, including lungs, cardiovascular system, gastrointestinal system, kidney, adipose tissue, and central nervous system. ACE2 plays a crucial role in the renin-angiotensin aldosterone system (RAAS). ACE2 hydrolyzes various peptides, like angiotensin I-II to be angiotensin 1-7 and angiotensin 1-9 respectively. The conversion of angiotensin II to vasodilatory angiotensin 1-7 signifies the ability of ACE2 on suppressing the vasoconstrictor action by angiotensin II (Patel et al., 2016; Gheblawi et al., 2020).

SARS-CoV-2 binds to ACE2, primed by TMPRSS2, a transmembrane serine protease (Hoffmann et al., 2020). The manifestation of COVID-19 sex dimorphism may relate well to the expression level of ACE2 encoding gene (ACE2). ACE2 is X-linked gene located on the Xp22.22 region with 41,04 kb long (Gemmati et al., 2020). ACE2 is also one of several genes in X chromosome that 'escapes' from the X chromosome inactivation mechanism, thus the expression level of ACE2 is thought to be higher in women than that of men (Tukianen et al., 2017). However, several renal disease studies show that ACE2 was stronger expressed in males than in females under pathological conditions (Liu et al., 2010; Soler et al., 2012; Roberts et al., 2013). Furthermore, recent study shows that higher level of ACE2 was detected in the testes than the ovaries. (Chen et al., 2020). Consistent with the previous report, ACE2 was also considered to be highly expressed in testicular cells as the testes was one of the sites with higher ACE2 expression in three independent RNA expression databases (Human Protein Atlas, FAMTOM5, GeTx). Other studies show that the testes may serve

as male specific viral reservoir and that the SARS CoV-2 caused testicular gonadal loss-of-ability in SARS-CoV-2 patients (Shashtri et al., 2020; Ling et al., 2020).

Although ACE2 level in testes and kidney under pathological condition shows different expression between men and women, there was still unclear whether ACE2 is generally differed by sex in different organs targeted by SARS-CoV-2 infection, for example in the lung. ACE2 in the lung functions as anti-inflammatory against lung damage. Similar with TMPRSS2, ACE2 is expressed in the bronchial transient secretory cells (Lukassen, et al., 2020). However, there is no current study which specifically shows if ACE2 in the lung under pathological condition is differed by sex.

On the other hand, the sex-specific immune response studies have highlighted how sex hormones may have significant interaction in tissue-based renin-angiotensin system, including ACE2. In the previous SARS-CoV outbreak, the binding of spike protein of SARS-CoV to ACE2 induced ACE2 downregulation which in turn decreasing ACE2 expression in the lungs and caused acute respiratory failure (Channappanavar et al., 2017). Estrogen has been known to modulate the activity of various renin-angiotensin system components, including ACE2, angiotensin II receptor type 2 (AT2R), and MAS. A study in human atrial myocardium acquired from patients experiencing heart surgery has shown that estrogen has protective role to the heart by shifting the normal RAS/ACE2 axis to the protective RAS/ACE2 axis. This shift of RAS/ACE2 axis caused by estrogen is shown by downregulation of ACE and upregulation of ACE2, angiotensin II receptor type 2, and MAS (Bukowska et al., 2017). It is interesting to consider the role of estrogen is to increase the ACE2 expression to treat SARS-CoV-2 as it shares similar mechanism of infection with the previous SARS-CoV. As women generally have higher estrogen level,

it may also explain how women are better protected from the SARS-CoV-2 infection than that of men.

In conjunction with SARS-CoV-2 infection, transmembrane protease serine 2 (TMPRSS2) plays a role to prime SARS-CoV-2 spike protein to bind with ACE2 receptor on the transmembrane of the cells (Hoffmann et al., 2020). TMPRSS2 is widely expressed in various tissues. TMPRSS2 is highly expressed in prostate epithelium than other tissues (Lin et al., 1999; Lucas et al., 2014). In vitro studies show that TMPRSS2 transcription was strongly induced by the androgen and the fusion genes of TMPRSS2-ERG which was found in prostate cancer cells and could be regulated by estrogen receptor (Lin et al., 1999; Setlur et al., 2008). However, there is no current study which shows estrogen can also regulate TMPRSS2 transcription in regards to mechanism of SARS-CoV-2 infection. Nevertheless, the role of TMPRSS2 in priming the spike protein of outer layer SARS-CoV-2 to the ACE2 receptor at least contributes to the cause of higher fatality cases in males affected by COVID-19.

In the Yale group research, whose samples were collected before immunomodulatory therapy, there were differences in immune responses between 45 men and 48 women when infected with COVID-19. This examination found that of male patients had higher CCL5 and CXCL8 plasma levels rather than that of female. In addition, women had IL-15 and TNFSF10 cytokines which correspond with worse results. Immunological characteristics, such as terminally differentiated CD8⁺ T cells, numerous CD14⁺ CD16⁺ monocytes, and activated T cells were more found in women. CD14^{low} CD16⁺ monocytes were more found in men, but had less CD8⁺ T cell response in disease progression. All things considered, these outcomes, concerning clinical characteristics, proposed a less robust T cell-mediated immunity in men

correspond with severe results and higher innate cytokine action in women (Takahashi et al., 2020).

Interestingly, IgG antibody characteristics detected in the serum between 127 men and 204 women with COVID-19. IgG antibody concentrations in men and women with mild symptoms, general, and recovered patients showed no difference. However, compared to men, women have relatively higher IgG antibody concentrations in severe symptoms. In severe conditions, women have IgG concentration more than 100 AU/mL, yet below 100 AU/mL in men. In the early phase of the disease, the concentrations of IgG antibody in women is higher than in men (Zeng et al., 2020).

3. Women Clinical Symptoms and Psychological Risks when Exposed to COVID-19

Although genetically women are not more susceptible than that of men and had a better immune system, they face the same severe symptoms in clinical outcomes as well as in men. The clinical indications of women infected with COVID-19 are firstly mild symptoms, no pneumonia. Second, common cold, fever, respiratory tract symptoms, and pneumonia occur. Third, respiratory distress, respiratory rate ≥ 30 beats/min take place. Fourth, finger oxygen saturation $\leq 93\%$ with arterial blood oxygen partial pressure arise. Respiratory failure occurs and requires mechanical ventilation. Shock occurs and ICU admission is required for combined organ failure (Jin et al., 2020).

COVID-19 in women are usually accompanied by other diseases, such as hypertension, cardiovascular disease, diabetes, asthma, malignant, and chronic liver disorders. Common signs in women include fever, coughing, shortness of breath, anorexia, lethargy, myalgia, and diarrhea (Liu et al., 2020). In pregnant women, the signs include coughing, fever, anosmia,

and shortness of breath. The average of pregnant woman who are infected with COVID-19 is more than 35 years of age and suffered from obesity, diabetes, preeclampsia, and pregnancy hypertension (Kayem et al., 2020). 17-year-old pregnant women with 29 weeks of pregnancy showed clinical symptoms include fever, shortness of breath, temperature of 37.3°C, tachypnea, and rhinitis (Martinelli et al., 2020). Breast cancer cases in women show clinical symptoms of tachycardia, rapid breathing, no fever (Cetin et al., 2020). COVID-19 has an effect in central nervous system of USA women aged 50 years old manifested with some neurological symptoms acute necrotizing encephalopathy confirmed in CT scan. It showed that there was blood brain barrier vessel leakage in the thalamus (Balachandar et al., 2020).

In this pandemic, women have a greater impact of depression, anxiety, and post-traumatic stress disorder (Gonzales-Sanguino et al., 2020). Women health workers who have worked more than 10 years, suffered from concomitant chronic disease, owned a history of mental disorders, and had family infected COVID-19 were more susceptible to stress, depression, anxiety, and mental problems (Zhu et al., 2020). The health care female working as a general practitioner showed symptoms of anxiety, insomnia, and delusion (Anmella et al., 2020). In Myanmar, women felt depression and loneliness (Samia et al., 2020). Women

at younger age who came in direct contact with people infected by COVID-19 tended to have sleep problems, anxiety symptoms, and psychological distress (Casagrande et al., 2020).

Some people perceive the COVID-19 increases frustration, anxiety, and maladaptive reaction. People have to deal with mental and physical health to be adaptive. Proportion of women in some occupations with high risk groups, including medical staff, is higher than that of men. In the period of COVID-19 pandemic, women were more sensitive to guarantee the stability in family, educate their children, and control the family member stress and emotions. All that multiple stress levels have an impact on the women's psychology and physical health. Medical staff showed more intense fear, stigma, and anxiety than others (Tien et al., 2020).

4. Vulnerability Factors in Socio-cultural Aspects

According to data from the Jakarta Open Data, the number of female residents in DKI Jakarta reached 49.54% (Jakarta Open Data, 2019), while the female population in East Java reached 50.63% (BPS-Statistics of East Java Province, 2020: 46). As of July 2020, the transmission of COVID-19 in DKI Jakarta and East Java occurred in several clusters which is categorized as follows.

Table 1. COVID-19 Case Clusters in DKI Jakarta and East Java Provinces

DKI Jakarta	East Java
Hospital	Local Transmission (Settlements)
Community	Market and Fish Auction Place (TPI)
Settlements	Hospital
Market	Workplace
Offices	Worship Place
Religious Activity	Seminar
Ship Crew (ABK) and Migrant Worker	Mall
Nursing Home	
Prison	

Sources: Public Communication Team for the COVID-19 Task Force, 2020; Kumparan Editorial, 2020

Table 1 classifies the vulnerability factors of women by looking at their potential distribution in the community based on profession or activities in the workplace, as well as social interactions in society. In addition, the researchers also added a vulnerability factor based on daily mobility

in public transportation that could potentially be a cluster of COVID-19 transmission.

From the confirmed cases and PDP data of East Java and DKI Jakarta, the vulnerability exposed to COVID-19 was more likely to occur on women at a productive age. Productive age ranges from 15-64 years.

Table 2. Percentage of Population Aged 15 Years and Over Who Worked in the Past Week by Province and Main Employment in 2017

Province		DKI Jakarta	East Java
Agriculture, plantations, forestry, hunting, and fishery	Women	0.41	32.03
	Men	0.34	34.34
Mining and excavation	Women	0.17	0.13
	Men	0.41	1.24
Industry	Women	11.64	15.36
	Men	13.85	14.77
Electricity, gas, and drinking water	Women	0.29	0.08
	Men	0.48	0.42
Construction	Women	1.36	0.26
	Men	5.78	11.73

Trade, restaurants, and accommodation services	Women	39.42	31.65
	Men	30.31	16.74
Transportation, warehousing, and communication	Women	3.50	0.91
	Men	14.96	5.23
Financial institutions, insurance, rental business, and company services	Women	9.30	1.95
	Men	11.00	2.88
Social services, social, and personal services	Women	33.90	17.62
	Men	22.87	12.65

Source: Susenas, 2017 in Profile of Indonesian Women by the Ministry of Women Empowerment and Child Protection, 2020.

Table 2 shows that in DKI Jakarta, the highest tendency for women to work is in trade, restaurant, and accommodation service. The second-highest percentage is then found in the field of community, social, and personal services. While in East Java, the highest percentage is found in the sectors of: 1) trade, restaurants, and accommodation services; 2) agriculture, plantations, forestry, hunting, and fishery; and 3) industry. Although both data signify that women mostly work in the trade, restaurant, and accommodation services sector, this sector during the COVID-19 pandemic period experiences stagnancy or decrease thus that it is not considered as a cluster of the spread of COVID-19. However, the sectors that contribute to the spread of COVID-19 are health, cigarette industry, and offices.

a. Medical

At the time when access to leaving house is restricted and the economic sector deteriorates, the health sector, classified in number 9 as a social service, is urgently needed. However, in medical sector, there is an inequality in the number of male and female doctors. In Indonesia, the number of medical personnel (nurses) was 71% female

(National Commission on Violence Against Women, 2020). In society's stigma, female doctors are regarded unusual.

This is where the role of gender stigma in society occurs (Shannon et al, 2019). The doctor profession is deemed more suitable for men since it reflects the ideal traits of masculinity, such as being fully rational, not emotional, and owning physical strength. Meanwhile, the nurse profession is deemed more suitable for women because the stigma of women in society is inseparable from the role of care, such as caring for children at home. Besides, women face obstacle when they seek for doctor profession because gender is also considered in the selection of doctors. The stigma of masculine values as a doctor that is considered only owned by men is a big obstacle in the selection of female doctors. The perspective stating that child care role is entirely done by women is another obstacle occurring in society. Being a doctor can be busier than becoming a nurse thus a time to take care for children is less (Kruijthof, 1992). These factors results in the smaller number of female doctors than that of female nurses.

Different vulnerability to COVID-19 exposed between doctors and nurses according to sex was seen in patients who died in East Java. On July 7, 2020,

the Chairperson of Regional Board of the Indonesian National Nurses Association East Java reported that 248 nurses were confirmed positive. The most affected members were in Surabaya with 108 nurses, Sidoarjo 65 nurses, and other regions. From the 248, more than 50% were recovered, 30% were treated, 12% died, and the rest were in self-quarantine. From the 12% who died, nine were women (Tempo, 2020). The number of doctors who died due to COVID-19 in East Java (not including Surabaya) was 13. Of the 13 people, one was woman (Tempo, 2020). This figure shows the ration of doctors who died between men and women was 12:1. Meanwhile, the ratio of male nurses who died compared to women was 1:3. The vulnerability of doctors in East Java was higher in male doctors and female nurses as evidenced from the imbalance in numbers. The more medical personnel are, the greater their potential to be exposed to COVID-19 as they interact directly with the confirmed patients, PDP, or OTG (people without symptoms). The number of male specialist doctors was 3.843 and the number of female specialist doctors was 2.389. While, the number of male nurses was 17.147 and the number of female nurses was 30.110 (East Java Health Profile Book, 2018).

The number of health worker exposed to COVID-19 in Jakarta was unknown by sex since there were no reports either from the media or other sources. The most recent data related to medical personnel exposed is as of April 10, 2020. There were 161 health workers who were tested positive for COVID-19, with two patients were dead. They were spread across 41 hospitals (RS), 4 health centers, and 1 clinic in DKI (Kompas, 2020a).

Although the data of health workers exposed to COVID-19 in Jakarta and East Java are not reported by sex, the number of men and women specialist doctors and nurses can be a picture of the vulnerability potential of COVID-19 exposure in Jakarta.

The number of male specialist doctors was 2.450 and the number of women was 1.845. While, the number of male nurses was 4.047 and the number of female nurses was 18.001 (DKI Jakarta Health Profile, 2017).

b. Cigarette Industry in East Java

In East Java, industry sector contributed for COVID-19 spread with the cigarette industry was the most extensive COVID-19 spread area after the market (Tribunnews, 2020a). Some cigarette industries were closed because some of their employees were tested positive for COVID-19. In Kediri, Tulungagung, there were 43 workers tested positive (Liputan6, 2020), while PT Tanjung Odi Sumenep recorded five positive workers (Tribunnews, 2020b), and Sampoerna recorded 65 positive workers. There were several cigarette industries zones which were classified as red zones, such as Gubeng Surabaya, Wonokromo, Krembangan, Sawahan, and Tambaksari; 2) Sidoarjo in the Waru Districts, Taman, Sidoarjo City, and Temple; 3) Gresik in Gresik Kota, Menganti and Driyorejo Districts; and Mojokerto in the Districts of Kemlagi, Jetis, Mojosari, and Pungging. In Pasuruan, the red zones were in the Districts of Bangil, Beji, Gempol, and Pandaan. (Detik.com, 2020). Although no data has been found yet related to the number of COVID-19 confirmed cases by sex, according to data from the Ministry of Industry (Kemenperin), the total workforce hired by the cigarette industry sector amounted to 5.98 million people with 90% were women (JPNN, 2020).

The amount of 90% gives a huge opportunity for women to be exposed to COVID-19. Cigarettes are a labor-intensive industry. However, cigarette industry workers must have skills, accuracy, crafts, and patience in the process of rolling, cutting, and packing tobacco. Female workers are generally needed to complete these jobs (Hayutama, 2013). Skills, conscientious,

diligent, and patient are the characteristics stigmatized with women.

c. Offices Cluster

Large-Scale Social Restrictions (PSBB) in Jakarta, which began to be loosened since June 2020, has made office activities

start again. The return of employees who worked from office (WFO) turned out to have a negative impact on the vulnerability of the COVID-19 exposure because air circulation in offices was not fluent. If one employee is exposed to COVID-19, it will easily spread to other employees (Kompas, 2020b).

Table 3. DKI Jakarta Offices Cluster Data

Number	Office	Total	Number	Office	Total
1	Department of Food, Maritime, and Agricultural Security, North Jakarta	23	1	PT Antam Office	68
2	Samsat Polda Metro Jaya	20	2	Central of Kimia Farma	20
3	National Institute of Public Administration	17	3	ACT	12
4	State Electricity Company	7	4	Samudera Indonesia	10
5	Karang Anyar Sub-District	7	5	Central of PMI	6
6	East Cempaka Putih Sub-District	7	6	PT Indofood Pamedangan	6
7	West Cempaka Putih Sub-District	7	7	BRI	5
8	National Nuclear Energy Agency (BATAN)	5	8	PT SP Walikota Jakbar	3
9	BPOM	5	9	Pertamina	3
10	BPKD	4	10	Indosat	2
11	Department of Transportation MT Haryono	4	11	PSTW Kepala Dua Wetan	2
12	Judicial Commission	3	12	Canteen	2
13	LKPP	3	13	Siemens Pulogadung	1
14	Department of UMKM DKI 3	3	14	My Indo Airland	1
15	Tanjung Priok Sub-District	3	15	PT NET	1
16	Papanggo Sub-District	3	16	Mandiri Sekuritas	1

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			Number	Ministry	Total
17	Menteng Sub-District Office	2			
18	BPK	2	1	Ministry of Finance	25
19	BNN	2	2	Ministry of Education and Culture	22
20	Information Communication and Statistic DKI Jakarta	2	3	Ministry of Tourism and Creative Economy	15
21	Koja Sub-District Office	2	4	Ministry of Health	10
22	Sunter Jaya Sub-District	2	5	Ministry of Youth and Sport	10
23	Kebon Bawang Sub-District	2	6	Ministry of Energy and Mineral Resources	9
24	BBPK	1	7	National Institute Health Research and Development	8
25	Bhayangkara	1	8	Ministry of Agriculture	6
26	BPAD	1	9	Ministry of Transportation	6
27	Cempaka Putih Sub-District Office	1	10	Ministry of Marine Affairs	6
28	South Kembangan Sub-District Office	1	11	Ministry of Foreign Affairs	3
29	Regional Income Agency Rates	1	12	Ministry of Administrative and Bureaucratic Reform	3
30	Pamdal (Independent Police)	1	13	Ministry of Communication and Information Technology	3
31	Resort Police of North Jakarta	1	14	Ministry of Law and Human Rights	1
32	Department of Forestry	1	15	Ministry of Defense	1
33	Income Office Region	1	16	Ministry of Research and Technology	1
	18		17	Ministry of Environment	1
	Ministry of Women Empowerment and Child Protection		1		

Source: www.covid19.go.id

Based on Table 3, 68 offices are exposed to COVID-19. Eighteen offices are from the ministry, 34 offices are from the DKI Jakarta government, 16 offices are from the corporate sector with total positive cases of Covid-19 are 440 persons. Although no specific data regarding the segregation of women and men who are exposed to COVID-19, we can see the vulnerability by finding out the initial number of employees in their office by sex.

As viewed from the DKI Jakarta government office cluster, women employees are more likely to be exposed to COVID-19 than men. This can be seen from the number of female employees who are more than men. According to certain functional positions, general functions, structural, echelon V to echelon I, the number of female employees was 34.730, while the number of male employees was 30.750 (Jakarta Central Bureau of Statistics, 2019). More number of employees leads to greater potential of COVID-19 exposure.

While, in the ministry offices, the number of male employees is more than that of female. As seen from the number of civil servants at the central level in 2016, the number of male employees was 547.625, while the number of female employees was 370.819 (BPS-Statistics Indonesia, 2017: 55). This condition results in the lower potential for women to be exposed.

In East Java, as of July 15, 2020, there were 17 offices, including cooperatives exposed to COVID-19. The 17 offices were RRI, PT Sorini, PT SS, Kedaung Employees, PT Indo Sedati, Situbondo Cooperative Employees, PT KML Gresik, PT Petrokimia Gresik, PT Kimia Farma Jember, PT Santon Sampang Regency, PT DLU, Gojek Driver, TK Factory, Pacitan Power Plant, Mg Darmo Bank, PT ATI, and BKN Bratang Bank (Kumparan, 2020b). There is no exact data in the number of positive cases in each office, but the data imply that there are 272 of confirmed cases in East Java in 17 offices and three cigarette factories.

The 17 offices are classified by the type of employment based on Table 2 as follows: nine offices are industrial sectors (PT Sorini, PT. SS, Kedaung, Kimia Farma, PT Sonton, PT KML Gresik, Petrochemical, PT ATI, and PT TK), two are transportation sectors (PT DLU and Gojek), three are financial institutions sectors (BKN, Mg Darmo Bank, and Situbondo Cooperative), and one are electricity sector (PLTU). Even though there is no number of workers based on genders, the percentage in Table 2 signifies that there are more women in the industrial sector than that of men with a percentage of 15.56% for women and 14.77% for men. Whereas in the transportation, electricity, and financial institutions sectors, the percentage of women is smaller than that of men. Based on the percentage, it indicates that the opportunities for female workers in the industrial sector are higher in exposure than that of male workers. Meanwhile, the number of women in the electricity, transportation, and financial sectors are smaller than that of male workers, leading to the less potential to be exposed to COVID-19.

d. Market

According to Indonesian Market Traders Association (IKAPPI) data as of July 27, 2020, out of 1,251 traders confirmed to be positive for COVID-19 in 211 markets throughout Indonesia, the highest transmission was found in DKI Jakarta, totalling 317 people in 47 markets. In DKI Jakarta, the market ranked fourth as the cluster of the most COVID-19 confirmed cases (Kabar24, 2020). Whereas in East Java, according to data from the COVID-19 Task Force Expert Team, as of July 7, 2020, out of a total of 141 contagion clusters, the market became the most COVID-19 contagion cluster with a total of 31 clusters/markets and 199 confirmed cases (Kumparan, 2020b).

Based on these conditions, both in DKI Jakarta and in East Java, the potential

for COVID-19 transmission in the market is very high, not only among traders, but also visitors. It is also supported by a large number of daily visitors in a limited area thus crowd and physical contact will be tough to avoid.

In addition, cultural conditions that consider women to be identical with market activities, related to women's dual role in participating in the family economy and taking care of the household, also have an impact. The high number of women who have activities in the market, both as traders and buyers, also increase the vulnerability of women exposed to COVID-19.

e. Community, Local Transmission/Settlements, and Religious Activity/Worship Place

The accumulation of confirmed cases that occur in these cluster categories is very high, especially those that occur in communities and settlements. Based on the results of active case finding and contact tracing by the DKI Jakarta Health Office Surveillance Team from June 4 to July 26, 2020, the community's confirmed cases reached 34%. Local settlement/transmission emerged as a new category of clusters during the transition of PSBB of 283 clusters with 1.178 confirmed cases. This condition made settlement to be the cluster with the most confirmed cases in that period. During the transition of PSBB period, there were 114 confirmed cases from 9 clusters coming from activities in churches, mosques, priests' dorms, boarding schools, and *tahlilan* (Islamic practice/ritual) (Public Communication Team for the COVID-19 Task Force, 2020).

The same thing also happened in East Java. Based on the "Cluster Data Analysis in East Java" by the COVID-19 Task Force as of July 7, 2020, the confirmed cases were also quite high. There were 34 local transmissions/residential clusters by regency with a total of 686 cases. In addition, there

were three clusters of religious activities/worship places with 200 cases coming from mosques and *pesantren* (Islamic boarding house) (Kumparan, 2020b).

These clusters have a very high COVID-19 distribution risk in the community. The potential for broader coverage interactions was also very high due to the more general characteristic of the cluster and not limited by space. Although no specific data has been found yet related to the number of confirmed cases in the category of these clusters by gender, it indicates that the percentage of the population that has the potential for women exposed to COVID-19 in East Java is slightly higher than in DKI Jakarta. Accumulatively, the percentage of the female population in the two provinces of 50.08% is also relatively high and tends to be more vulnerable to be exposed to COVID-19.

f. Mobility in Public Transportation

According to BPS-Statistics Indonesia data, from 2006-2007, the number of female workers increased by 3.3 million, while men's participation only increased by 1.1 million (BPS-Statistics Indonesia, 2017). Over time, opportunities for women to work are increasing. This is supported by the fact that in 2016, Indonesia was placed as the top 10 countries in the world for the number of women in a senior management position (CNN Indonesia, 2016)

Jakarta also has a high enough work participation of women, especially in the office sector. When talking about work participation, it certainly cannot be separated from the mobility of women themselves. Public transportation is crucial in mobilizing them to work. Commuter line is one of the most popular modes of transportation. Jabodetabek (Jakarta-Bogor-Depok-Tangerang-Bekasi) commuter line passengers are included in the category of commuters which travel and depart for elsewhere and will return later that day.

According to the data, commuter line passengers increase by 13.8 percent each year. It mostly came from private employees by 72%, students by 15.2%, civil servants/military/police by 7.1%, entrepreneurs by 3.5%, and pensionary by 2% (Nazwirman & Hulmansyah, 2017). That is in line with the age range of commuter line passengers who are included in productive age.

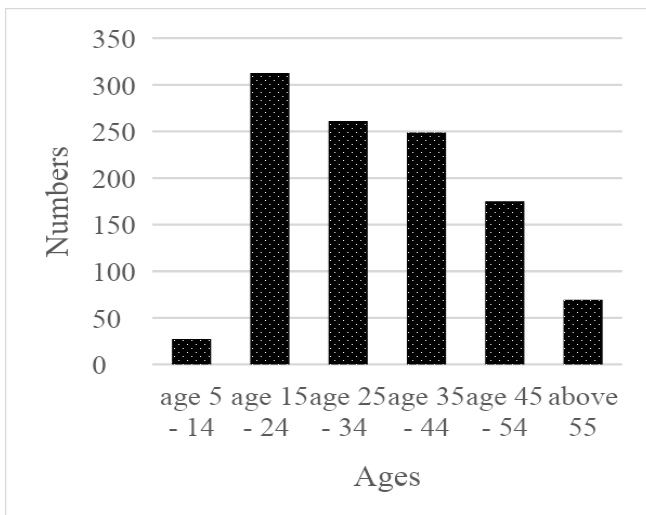


Figure 6. DKI Jakarta Commuter Line Passenger by Ages (statistik.jakarta.go.id)

During this pandemic, the commuter line becomes one of the vulnerable spots for COVID-19 transmission because the commuter line has limited space and a high number of physical interactions. Not surprisingly, the DKI Jakarta government has made the commuter line as one of the focuses of controlling the potential of COVID-19 transmission (Kompas, 2020c). Women certainly become more vulnerable to be exposed to Covid-19 because their mobility on public transportation mode/commuter line is quite intensive. Offices in Jakarta resumed operations on June 8 with operating 50% of employees. This number still has potential risks to female workers.

Workers have no alternative transportation other than the commuter line. One of the commuter line female passengers

said that she was afraid but she had no choice to get to the workplace other than using the commuter line (Sindonews, 2020). The number of commuter line passengers increased until its peak occurred in early July 2020 with 419.292 passengers (Tempo, 2020b). Jabodetabek (Jakarta-Bogor-Depok-Tangerang-Bekasi) commuter line passengers are included in the category of commuters which travel and depart for elsewhere and will return on the same day. Based on the previous explanation, the number of female workers has an impact on women's mobility, in this case, the use of public transportation to work. The continuous mobility of women creates a high risk of being exposed to COVID-19.

Conclusion

The results of this study denoted that men had a higher number of confirmed PDP, ODP, and death cases than that of women in both DKI Jakarta and East Java. The number of recovered cases for men in DKI Jakarta was higher than that of women, but it was not significantly different in East Java. Factors including differences in ACE2 distribution and expression, immune responses, hormones regulations, comorbidities, and ages between men and women affected the severity of dealing with COVID-19. Based on these factors, women were more resilience in manifestations of COVID-19 severity than that of men. However, in both provinces, women were potential vulnerable being exposed to COVID-19 since many women performed as health workers, office workers, market traders, users of public transportation, and carried out religious activities. Special medical condition such as pregnancy and mental health could determine the severity of COVID-19 in women. . In the future, similar research projects can be carried out by expanding the methods such as survey or interview with stakeholders to get more complex data.

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