

# COVID-19 vaccine acceptance in Notoprajan, Yogyakarta, Indonesia: a lesson learned from the pandemic

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## ABSTRACT

COVID-19 vaccination began in Indonesia in January 2021, with a minimum target coverage of 70% of the population. The government has delivered four doses of the COVID-19 vaccine, but doses three and four have yet to meet the target. Public acceptance of the COVID-19 vaccination has varied due to the speed of the introduction and implementation of this vaccination. Meanwhile, basic information about the factor's influencing acceptance has yet to be widely known. This study aimed to determine the relationship between sociodemographics and COVID-19 vaccine acceptance in Notoprajan, Yogyakarta, Indonesia. A cross-sectional study was used for this analytic survey. The population is 4,726 people, and the sample size is 355 people. People between the ages of 17 and 55 were eligible, as were those who had lived in Notoprajan, Ngampilan District, Yogyakarta, for at least three months. The data were analyzed using descriptive and bivariate analysis with a 95% confidence level ( $\alpha=0.05$ ) using the Chi-square statistical test. Among the six observed variables, namely age, gender, education, occupation, religion, and knowledge level, only sex significantly correlates with COVID-19 vaccine acceptance. This research indicates that to increase COVID-19 vaccination, related parties need to target women directly. This is because men received 1.47 times the COVID-19 vaccination from this study compared to women.

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## 1. INTRODUCTION

Vaccination is a strategy to provide active immunity to individuals against a certain disease, such as COVID-19. The COVID-19 pandemic started in Wuhan, Hubei, China, in 2019 and quickly spread to the rest of the world, where it was declared a pandemic [1]–[3]. This has a significant impact on all human life; not only is the number of cases increasing but so is the high mortality rate and social stigma [4]–[6]. To overcome this, emergency measures that are physical and intervene with the body's immune system are required. The first COVID-19 vaccine used was SinoVac, that approved for emergency use in life-threatening situations to achieve herd immunity in June 2021 [7], [8].

The COVID-19 vaccine was first introduced in Indonesia in January 2021. Since then, mass vaccinations have been carried out throughout Indonesia in several phases, according to the priority scale of target stages as shown in Figure 1. This phase's sequence considers the need (urgency) and vaccine availability [9]. The ultimate goal of this mass vaccination is to achieve a minimum coverage of 70% of all targets in Indonesia for COVID-19 vaccination [10].



Figure 1. The COVID-19 vaccination priority target in Indonesia

The Indonesian government uses several vaccine variants for COVID-19 vaccination, including the CoronaVac vaccine (Sinovac), Bio Farma's COVID-19 vaccine, AstraZeneca vaccine, Sinopharm vaccine, Moderna vaccine, Comirnaty vaccine (Pfizer and BioNTech), and Sputnik-V vaccine, Janssen COVID-19 vaccine and Convidecia vaccine [11]. There are specific vaccines for specific groups, but there are also used for the general population. Each vaccine also has potential Adverse Events Following Immunization (AEFI) depending on the body's response. Until recently (January 2023), four doses of the COVID-19 vaccine have been administered: one primary dose and three booster doses. National vaccination results for doses 1 and 2 have exceeded the target (more than 70%) with a target of more than 234 million. However, vaccine dose 3 did not achieve coverage yet, and dose 4 is still at stage 1 or a health worker [12]. Figure 2 shows COVID-19 vaccination coverage in Indonesia (Dose 1- 4) until January 14, 2023.

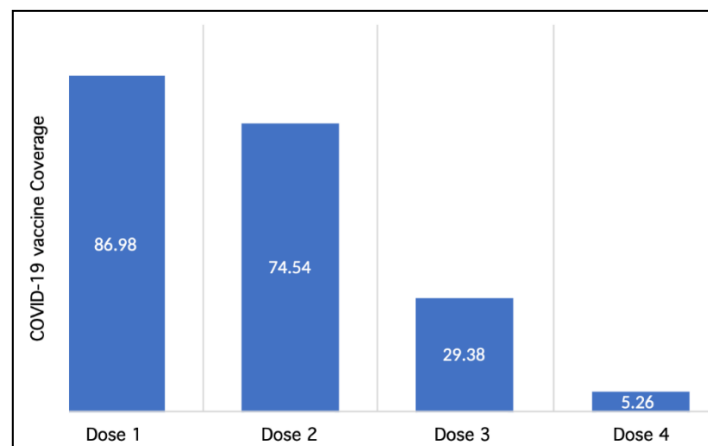


Figure 2. COVID-19 vaccination coverage in Indonesia (Dose 1- 4) until January 14, 2023

Public acceptance of the COVID-19 vaccination has varied due to the speed of the introduction and implementation of this vaccination. Meanwhile, basic information about the factor's influencing acceptance is not yet widely known. Individual intrinsic and extrinsic factors, such as environmental opinions and personal beliefs, influence acceptance of the COVID-19 vaccine [13]–[15]. Previous research in Northern Peru has found a link between COVID-19 vaccine acceptance and age, family income, level of knowledge, having another chronic disease, and a more trustworthy vaccine [16]. Meanwhile, vaccination has always been a challenge in Muslim-majority countries, such as the halalness of this vaccine [17]. This study looks at what factors influence vaccine acceptance in terms of sociodemographics and religious reasons by looking at the coverage of vaccination doses 3 and 4, which are still far from this target. This research was conducted in Notoprajan Village-Yogyakarta, which has an urban setting.

## 2. METHOD

### 2.1. Study design, participants, and ethical approval

This research was an analytic survey using a cross-sectional study conducted in Notoprajan Village, Ngampilan Sub-District, Yogyakarta, that was conducted on July 2022. The study was approved by the Ethical Review Board of Universitas Ahmad Dahlan, Yogyakarta, Indonesia (ethical approval code: 012111091).

The population for this study was 4,726. We recruited people aged 17-55 who have lived for at least three months in the Notoprajan Village, Ngampilan District, Yogyakarta City, to participate in our survey, which was selected using accidental sampling. In total, 355 respondents participated in this study, that calculated using the Raosoft sample calculator by considering the 5% margin of error and 95% confidence level.

## 2.2. Data collection and instrument

We used a questionnaire consisting of three sections: i) information about characteristic respondents, ii) knowledge about the COVID-19 vaccine, iii) COVID-19 vaccine acceptance to collect information from the participant. This questionnaire was pre-tested before being used with Cronbach's Alpha 0.75 and 0.77 for knowledge and vaccine acceptance, respectively. The researcher visited the respondent door to door to seek respondents who fulfilled the criteria until the number of samples was completed using an electronic form.

## 2.3. Data analysis

Data were generated and cleaned in a Microsoft Excel spreadsheet before conducting descriptive and Chi-square analyses. For sociodemographic and knowledge distribution, descriptive analysis was performed first. The Chi-square test examined the relationship between sociodemographic factors and COVID-19 vaccine acceptance using the crude odds ratio (COR) with a 95% confidence interval (95% CI). Before proceeding with the relationship analysis, the data were classified as follows: for knowledge questions, a score of 1 was assigned if the respondent answered correctly, and a score of 0 was assigned if the respondent answered incorrectly. Then, for knowledge categorization, a score of  $\geq 9$  medians were considered sufficient, and a score of  $< 9$  was considered insufficient. Vaccine acceptance was measured using a 5 Likert scale with a range score of 5 to 1 (Strongly agree to Strongly disagree) for favorable and vice versa for unfavorable. Acceptance of the COVID-19 vaccine is classified as positive if the score is  $\geq 36$  median and negative if the score is  $< 36$  median when receiving a scoring vaccine.

## 3. RESULTS AND DISCUSSION

### 3.1. Result

#### 3.1.1. Characteristics of respondents

Table 1 displays the characteristics of the 355 respondents who participated in this study. More than half of those polled were between 17 and 25. More than half of the respondents (63.3%) are female. Most of our respondents are junior high and high school graduates, accounting for nearly 80% of all respondents. Regarding employment, almost half of all our respondents are high school or college students. Most of our respondents are Muslims who have been immunized against COVID-19. More than half of our respondents have received vaccine doses 1 and 2, with the majority receiving the vaccine at the puskesmas. More than 60% of our respondents say their favorite source of information is social media.

#### 3.1.2. Sociodemographic, knowledge level, and COVID-19 vaccine acceptance

Table 2 shows the respondent's distribution frequency based on the category used. The majority of respondents (75.8%) were adults. The majority of them are female. More than half (56.9%) of respondents had higher education. Only 40.6% said they were employed. The majority of them are Muslims. More than half (55.2%) of those polled believe they know enough about the COVID-19 vaccine. More than half of those surveyed said they would accept the COVID-19 vaccine.

Table 3 reveals the respondents' knowledge of the COVID-19 vaccine delivery. More than 90% of respondents reported correctly about the substance and functions of the COVID-19 vaccine. Most respondents (70%) answered false when asked if vaccination could prevent 100% of COVID-19 infections. The majority (69.9%) of respondents said honestly that vaccines are typically administered via injections and drops in the mouth. More than 90% of respondents reported true that they received the COVID-19 vaccination and followed health protocols. More than 90% of respondents said honestly that someone infected with COVID-19 could be vaccinated three months after infection and that vaccines function to form herd immunity. A large number of the respondent (93%) reported true that people who could be vaccinated had blood pressures of 180/110 mmHg. Most respondents agreed that administering two doses of the COVID-19 vaccine would be optimal. As many as 40% of respondents answered honestly that if the period between receiving two vaccine doses exceeds six months, they are classified as dropouts and must start over. The benefit of the COVID-19 vaccine, according to 98% of respondents, is to provide protection and reduce the impact of infection.

Table 1. Respondent characteristics (n=355)

| Characteristics                                       | Frequency | Percentage (%) |
|---|-----------|----------------|
| Age (years old)                                       |           |                |
| 17-25   | 184       | 51.8           |
| 26-35   | 24        | 6.8            |
| 36-45   | 61        | 17.2           |
| 46-55   | 86        | 24.2           |
| Gender  |           |                |
| Male  | 141       | 39.7           |
| Female  | 214       | 60.3           |
| Education   |           |                |
| No/never attended school                              | 1         | 0.3            |
| Graduated from primary school                         | 9         | 2.5            |
| Graduated from junior high school                     | 143       | 40.3           |
| Graduated from senior high school                     | 160       | 45.1           |
| Graduated from university (diploma or higher)         | 42        | 11.8           |
| Occupation  |           |                |
| Not employed  | 18        | 5.1            |
| Housewife   | 27        | 7.6            |
| Student   | 166       | 46.8           |
| Teacher   | 14        | 3.9            |
| Civil servants/government employees                   | 4         | 1.1            |
| Private employees                                     | 55        | 15.5           |
| Entrepreneur  | 51        | 14.4           |
| Daily worker  | 20        | 5.6            |
| Religion  |           |                |
| Moslem  | 349       | 98.3           |
| Christian   | 2         | 0.6            |
| Catholic  | 4         | 1.1            |
| COVID-19 vaccination status                           |           |                |
| Yes, received   | 354       | 99.7           |
| Not received yet                                      | 1         | 0.3            |
| Dose Receive of COVID-19 vaccine                      |           |                |
| Dose 1  | 12        | 3.4            |
| Doses 1 and 2   | 224       | 63.1           |
| Doses 1, 2, and 3                                     | 118       | 33.2           |
| Not received yet                                      | 1         | 0.3            |
| COVID-19 vaccination locations                        |           |                |
| Public health center                                  | 193       | 50.1           |
| Doctor/Midwife/Hospital                               | 85        | 22.1           |
| Office/Workplace                                      | 22        | 5.7            |
| Educational Institution                               | 74        | 19.2           |
| Other locations                                       | 11        | 2.8            |
| COVID-19 vaccine information platform preference      |           |                |
| Social media (Whatsapp, Facebook, Instagram, Twitter) | 237       | 66.8           |
| Telecommunication (SMS, telephone)                    | 6         | 1.7            |
| Online platforms (Zoom, Skye)                         | 1         | 0.3            |
| Print and electronic media (TV, newspaper)            | 52        | 14.6           |
| Face-to-face communication                            | 58        | 16.3           |
| Not interested in seeking information                 | 1         | 0.3            |

Table 2. Distribution of sociodemographic knowledge and COVID-19 vaccine acceptance (n=355)

| Variable  | Frequency | Percentage (%) |
|---|-----------|----------------|
| Age   |           |                |
| Adult (17-45)                                     | 269       | 75.8           |
| Older (>45)                                       | 86        | 24.2           |
| Gender  |           |                |
| Male  | 141       | 39.7           |
| Female  | 214       | 60.3           |
| Education   |           |                |
| Lower (No school, primary and junior high school) | 153       | 43.1           |
| Higher (senior high school or higher)             | 202       | 56.9           |
| Occupation  |           |                |
| Not working                                       | 211       | 59.4           |
| Working   | 144       | 40.6           |
| Religion  |           |                |
| Moslem  | 349       | 98.3           |
| Non-Moslem  | 6         | 1.7            |
| Knowledge about COVID-19                          |           |                |
| Not sufficient                                    | 159       | 44.8           |
| Sufficient  | 196       | 55.2           |
| Acceptance of the COVID-19 vaccine                |           |                |
| Negative  | 162       | 45.6           |
| Positive  | 193       | 54.4           |
| Total   | 355       | 100            |

Table 3. Respondents' responses to the COVID-19 vaccine knowledge statements

| COVID-19 vaccine knowledge   | Respondents answer |      |       |      |
|--|--------------------|------|-------|------|
|  | True               |      | False |      |
|  | n                  | %    | n     | %    |
| Vaccines contain pieces of viral deoxyribo nucleic acid (DNA) that function to respond to viruses if they attack so that the body can develop antibodies | 346                | 97.5 | 9     | 2.5  |
| Vaccine delivery is 100% efficient in preventing contracting COVID-19  | 104                | 29.3 | 251   | 70.7 |
| The course of vaccines delivery, in general, can be through injections or mouth drops  | 248                | 69.9 | 107   | 30.1 |
| By implementing vaccination, it can stop the transmission of the COVID-19 virus while still complying with health protocols                              | 344                | 96.9 | 11    | 3.1  |
| The time for getting the COVID-19 vaccine to those who have been exposed to the virus is given threemonths after the infection                           | 324                | 91.3 | 31    | 8.7  |
| Vaccination can generate <i>herd immunity</i> in the society   | 334                | 94.1 | 21    | 5.9  |
| The requirement for receiving the COVID-19 vaccine is that blood pressure must be below 180/110 mmHg   | 330                | 93.0 | 25    | 7.0  |
| COVID-19 vaccine will be optimal when someone gets it at least twice   | 316                | 89.0 | 39    | 11.0 |
| If the 2 <sup>nd</sup> dose of vaccination is later than six months after the 1st dose, the vaccine starts the 1st dose ( <i>drop out</i> ).             | 158                | 44.5 | 197   | 55.5 |
| The COVID-19 vaccine is useful for providing protection and reducing the impact of you contracting COVID-19  | 348                | 98.0 | 7     | 2.0  |

Table 4 demonstrates the responses provided by respondents to their perceptions of the COVID-19 vaccine's acceptance. Most respondents agreed that they received the COVID-19 vaccination to protect themselves. Almost half of those polled disagreed with the statement that they were forced to get a COVID-19 vaccination. Most respondents said they did not refuse vaccines for religious reasons. The COVID-19 vaccine is safe, effective, and halal, according to 60.3% of respondents. When asked if they were afraid of follow-up events after immunization, 30.7% said they were, while 34.6% said they were not. Less than half of the respondents (44.2%) polled disagreed with the statement that they wanted to be vaccinated due to work requirements. Because they knew the benefits, 58.9% of respondents wanted vaccinated. The statement that they did not believe in the COVID-19 vaccine was rejected by 56.9% of respondents.

### 3.1.3. Bivariate analysis

We assessed the relationship between the acceptance of the COVID-19 vaccine versus the sociodemographic respondent (age, gender, education, occupation, religion and knowledge level. Among the independent variables, the only sex significantly associated with COVID-19 vaccine acceptance. Being male has a 1.471 times chance of having a positive acceptance of the COVID-19 vaccine compared to women (PR=1.471; CI=1.222-1.771; p-value=<0.001). While the other variables were no relationship with vaccine acceptance. The detail information is presented in Table 5.

Table 4. Respondent's response to question-related to COVID-19 vaccine acceptance

| Acceptance of COVID-19 vaccines                              | Respondents answer |      |       |      |                            |      |          |      |                   |      |
|--|--------------------|------|-------|------|----------------------------|------|----------|------|-------------------|------|
|  | Strongly agree     |      | Agree |      | Neither agree nor disagree |      | Disagree |      | Strongly disagree |      |
|  | n                  | %    | n     | %    | n                          | %    | n        | %    | n                 | %    |
| I am willing to be vaccinated for self-protection            | 161                | 45.4 | 169   | 47.6 | 15                         | 4.2  | 9        | 2.5  | 1                 | 0.3  |
| I had to get vaccinated                                      | 14                 | 3.9  | 29    | 8.2  | 32                         | 9.0  | 175      | 49.3 | 105               | 29.6 |
| I refuse vaccines because of my religious beliefs            | 2                  | 0.6  | 9     | 2.5  | 15                         | 4.2  | 185      | 52.1 | 144               | 40.6 |
| I believe in the safety and effectiveness of vaccinations    | 94                 | 26.5 | 214   | 60.3 | 42                         | 11.8 | 5        | 1.4  | 0                 | 0    |
| I believe in the halalness of the COVID-19 vaccine           | 78                 | 22.0 | 216   | 60.8 | 51                         | 14.4 | 9        | 2.5  | 1                 | 0.3  |
| I am afraid of the side effects of the vaccine (fever, pain) | 22                 | 6.2  | 109   | 30.7 | 82                         | 23.1 | 123      | 34.6 | 19                | 5.4  |
| I need vaccines because of work requirements                 | 21                 | 5.9  | 108   | 30.4 | 39                         | 11.0 | 157      | 44.2 | 30                | 8.5  |
| I need vaccines because I know the benefits of vaccines      | 109                | 30.7 | 209   | 58.9 | 27                         | 7.6  | 8        | 2.3  | 2                 | 0.6  |
| I don't believe in the COVID-19 vaccine                      | 4                  | 1.1  | 10    | 2.8  | 22                         | 6.2  | 202      | 56.9 | 117               | 33.0 |

Table 5. Chi-square test among six variables of COVID-19 vaccine acceptance

| Variable        | COVID-19 vaccine acceptance |      |          |      | Total | p-values | PR (95%)             |
|-----------------|-----------------------------|------|----------|------|-------|----------|----------------------|
|                 | Positive                    |      | Negative |      |       |          |                      |
|                 | n                           | %    | n        | %    |       |          |                      |
| Age             |                             |      |          |      |       |          |                      |
| Adult           | 142                         | 52.8 | 127      | 47.2 | 269   | 0.352    | 0.890 (0.723-1.096)  |
| Older           | 51                          | 59.3 | 35       | 40.7 | 86    |          |                      |
| Gender          |                             |      |          |      |       |          |                      |
| Male            | 95                          | 67.4 | 46       | 32.6 | 141   | 0.001    | 1.471 (1.222-1.771)  |
| Female          | 98                          | 45.8 | 116      | 54.2 | 214   |          |                      |
| Education       |                             |      |          |      |       |          |                      |
| Lower           | 114                         | 56.4 | 88       | 43.6 | 202   | 0.428    | 1.093 (0.899 -1.329) |
| Higher          | 79                          | 51.6 | 74       | 48.4 | 153   |          |                      |
| Occupation      |                             |      |          |      |       |          |                      |
| Working         | 86                          | 59.7 | 58       | 40.3 | 144   | 0.118    | 1.178 (0.975 -1.423) |
| Not working     | 107                         | 50.7 | 104      | 49.3 | 211   |          |                      |
| Religion        |                             |      |          |      |       |          |                      |
| Moslem          | 189                         | 54.2 | 160      | 45.8 | 349   | 0.692    | 0.812 (0.458-1.442)  |
| Non-Moslem      | 4                           | 66.7 | 2        | 33.3 | 6     |          |                      |
| Knowledge level |                             |      |          |      |       |          |                      |
| Sufficient      | 105                         | 53.6 | 91       | 46.4 | 196   | 0.821    | 0.968 (0.800 -1.172) |
| Not             | 88                          | 55.3 | 71       | 44.7 | 159   |          |                      |
| Sufficient      |                             |      |          |      |       |          |                      |

### 3.2. Discussion

The rapid spread of COVID-19 in Indonesia and worldwide is concerning, prompting health officials to seek solutions to prevent high vitality. As a result, WHO launched the COVID-19 vaccination program in early 2021, which was quickly adopted by all countries worldwide. On January 13, 2021, the COVID-19 vaccination was introduced in Indonesia, and it was then mass-implemented throughout the country, changing priority targets. People's acceptance of the COVID-19 vaccine varies; some refuse emphatically, some accept by force, and some accept voluntarily out of necessity. The Indonesian government has set a vaccination target of 70% of the total target for COVID-19. Meanwhile, the current results for vaccine dose 1 are greater than 85% and greater than 70% for dose 2. However, for dose 3, it is still less than 30% [18]. The cause of the inadequate coverage in dose 3 vaccination should be investigated. On the other hand, the basic information about the factor's influencing acceptance has yet to be widely known. Accordingly, this study aimed to see if there was a link between sociodemographics and knowledge of receiving the COVID-19 vaccine.

We discovered that sex is a factor that influences acceptance of the COVID-19 vaccine through a survey. Men are more likely than women to receive the COVID-19 vaccination. This study's findings are consistent with previous research, which found that men are more likely than women to get vaccinated with the COVID-19 vaccine. In other words, women tend to postpone or refuse the COVID-19 vaccine [19]–[21]. One of the reasons women deny or delay getting the COVID-19 vaccination is that the COVID-19 vaccine is too new and, from introduction to implementation, has a short period [20]. The woman considers uncertainty about the COVID-19 vaccine's safety and effectiveness, such as post-vaccination follow-up events, perceptions of the vaccine's benefits, including confidence in obtaining immunity, and responses from the environment and families about the COVID-19 vaccine [22].

In this study, we also observed the religious perceptions of acceptance of the COVID-19 vaccine. According to the findings, more than 90% of our respondents are Muslims, and more than 60% believe the COVID-19 vaccine is halal. Given that Indonesia has a Muslim majority, the issue of halal and its relationship to this belief arose during the introduction of the COVID-19 vaccine. Many issues were circulating about this issue in Indonesia at the start of the introduction, so several groups refused to receive the COVID-19 vaccine. To address this, the Indonesian government issued a legal fatwa regarding the Halalness of the COVID-19 vaccine through the Indonesian Religious Leader to increase public confidence in the COVID-19 vaccine and encourage the vaccination program currently in place [23], [24]. On the other hand, religion has nothing to do with vaccine acceptance because, at the beginning of this pandemic, the government imposed mandatory vaccinations so that everyone without exception must want to be vaccinated against COVID-19.

Another fascinating finding from this study is the respondents' reactions to their fear of the COVID-19 vaccination about adverse events following immunisation (AEFI). The percentages of those who agreed and disagreed that they were afraid of AEFIs were nearly equal, and no clear majority was found. The public still needs to learn about receiving the COVID-19 vaccine due to the presence of AEFI. During the introduction of the COVID-19 vaccination, there was a lot of misinformation about AEFI. People are hesitant to receive the COVID-19 vaccination due to misinformation such as the COVID-19 vaccine having a microchip, being dangerous, being the cause of death, and so on [25], [26]. The study's findings revealed that

the AEFI incidence of the COVID-19 vaccine at doses 1 and 2 was comparable to the trial results and in the community [27]. Other studies, on the other hand, found that because they had AEFI at dose 1, people were hesitant to receive dose 2 [9], [16], [28], [29].

This study may be limited by self-reported data bias, as the data collected is based on respondent information that is difficult to verify. The researcher attempted to control this response by reviewing each response collected after completing the data collection. In addition to collecting valid data, we used a pre-tested questionnaire that was evaluated for consistency. Despite its limitations, this research contributes to developing lessons and policies to increase vaccine coverage for the next dose.

#### 4. CONCLUSION

COVID-19 is a disease that is highly contagious and widespread. Getting a COVID-19 vaccination is one way to prevent the severity of COVID-19. However, not all vaccine doses have reached the required coverage level. According to this study, gender is a factor that influences a person's vaccine acceptance. As a result, it is suggested that relevant health authorities develop a risk communication and gender-based approach especially targeting women. The results of this study indicate that with the program currently running, men have a better acceptance of the COVID-19 vaccine than women (1.47 times higher). Thus, the acceptance that needs to be increased is for women. Based on the findings of this study, we recommend that local governments target women in increasing demand for the COVID-19 vaccine




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