Trusts on nerd immunity and health-associated apparatus predict the level of obedience of indonesians toward health resilience threat-anticipation enforced by the government

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Abstract. The global concept of One Health has gained popularity, with countries like Indonesia implementing policies to combat the pandemic. Despite this, many Indonesians have been slow to follow pandemic-related measures, such as getting vaccinated and social distancing. This study aims to investigate the connection between people's experiences, their understanding of One Health, and their willingness to follow government policies to prevent and control pandemics. Using numerically scaled surveys, we analyzed the relationships between these variables. We recruited 224 participants from 19 provinces in Indonesia. Our results show a strong link between trust built through experience and understanding of One Health, and people's compliance with government policies. This study emphasizes the importance of educating the public about One Health and building trust to improve adherence to future pandemic prevention measures.

1 Background

The concept of One Health, which emphasizes the interconnectedness of human, animal, and environmental health, has gained significant attention in recent years [1]. In response to this recognition, governments worldwide have implemented various measures to anticipate and prepare for pandemics. Indonesia, in particular, has been actively enforcing policies aimed at preventing and mitigating the spread of infectious diseases [2]. However, despite these efforts, many Indonesians have been slow to comply with pandemic-related measures, such as vaccination and social distancing. This phenomenon raises important questions about the

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factors that influence individuals' willingness to follow government guidelines during pandemics. While some studies have examined the role of trust in government policies on public compliance [3,4], few have explored the relationship between trust and understanding of the One Health concept [5–7]. In Indonesia, where traditional cultural practices and limited access to healthcare resources may contribute to scepticism about government efforts [8,9], it is crucial to understand the complex dynamics that shape individuals' decisions to adhere to pandemic-related measures. This study aims to investigate the correlation of experience-driven trust, understanding of the One Health concept of Indonesians, and their obedience toward government policies in the context to pandemics mitigation and anticipation. By exploring the intersection of these factors, we seek to shed light on the motivations that underlie individuals' willingness to follow government guidelines during pandemics, ultimately informing strategies to improve public compliance and mitigate the risk of future and unprecedented pandemics.

2 Literature Review

During pandemics, governments and health authorities rely on the public's compliance with public health measures to contain the spread of disease. However, the effectiveness of these measures is closely tied to the level of trust between individuals and institutions [4]. While understanding of a particular concept is crucial, it is often superficial and may not necessarily translate to trust [8]. Trust is the fondation of successful One Health initiatives [9]. It enables collaboration, encourages community involvement, facilitates data sharing, helps build resilience during crises, supports informed policy-making, and sparks innovation [9,10]. Recognizing the intricate relationships between these domains, individuals and communities will allow development of a deeper appreciation for the complex dynamics that shape our health [9,10]. This awareness allows us to better comprehend the impact of human activities on animal and environmental health, and vice versa, fostering a sense of shared responsibility and collective well-being [11,12].. In the absence of trust, even the most well-intentioned efforts can be hindered by suspicion and mistrust [16,17]. For example, without trust between veterinarians, doctors, and environmental scientists, efforts to address zoonotic diseases like COVID-19 may be impeded by siloed thinking and lack of coordination [18,19]. Numerous empirical studies have investigated the relationship between trust and obedience in the context of pandemic management. Obedience has been defined as the act of complying with rules, regulations, and guidelines, often in response to a perceived authority or authority figure [20,21]. A study using regional mobility data from Europe demonstrated that once containment policies are put into place in March 2020, a greater drop in non-essential travel is correlated with better levels of political trust. In high-trust areas, this effect is seen as a greater degree of obedience to national orders. Its magnitude corresponds with the impact of trust on the effectiveness of strict policy enforcement [22].

Moreover, a study with Japanese cohorts showed that People adopted greater infection prevention practices as their confidence in medical professionals and infected patients grew. On the other hand, there was a lower likelihood of such behaviors among individuals who trusted the national government and celebrities as information sources. Health communication academics and practitioners need to be aware of how people's confidence in information sources varies during a pandemic and how this trust is related to preventive actions in order to design effective communication methods [23]. As Indonesia’s healthcare system is undergoing reforms, including in the universal health coverage (UHC), investigating trust and obedience can inform the development of policies that promote effective healthcare delivery and improve patient outcomes [24,25].

3 Materials and Methods

3.1 Materials

We distributed a survey containing several statements (variables, Var) as follows:

Var 1 (X1): Indonesia has developed nerd immunity as a positive impact of the COVID-19 pandemic that has passed (Nerd Immunity)

Var 2 (X2): Indonesia already has adequate health- associated apparatus (doctors, nurses and other health workers as well as health service centers) (Health-associated apparatus).

Var 3 (X3): Each individual is provided with health insurance so that it is easy to get access to health facilities (Insurance protection).

Var 4 (X4): Score of basic understanding of pandemic concepts (per 100). This is critical because this understanding will affect the individual's mindset either directly and indirectly to their either acceptance or rejection on the concept of One Health [26,27]. As the most recently past pandemic was COVID-19, we formulated the question accordingly.

Var 5 (X5): Indonesian people (including me) comply with the protocols launched by the government (Obedience).

Each participant was facilitated to score 0-100 according to their best fit perspective or judgement. The questionnaire was built using google form. We spread the participation invitations randomly to a number of communities in several cities from different provinces. The inclusive criterion was that the participants must be 18 years of age or older. No gender or other social and cultural restrictions applied throughout this study.

Particularly for Var 4 (X4), we assessed the participants knowledge of One Health concept by questioning them three right-and-wrong questions as follows:

Question 1 (RIGHT): A pandemic is a disease attack in all countries with the number of infection cases increasing sharply and causing loss of life.

Question 2 (WRONG): 2. With the definition of pandemic that I know, in Indonesia ONLY COVID-19 is called a pandemic.

Question 3 (WRONG): The One Health concept is how to see human health as the only thing (one) that needs to be fought for over animal and environmental health.

The score was determined by a formula:

$$\frac{Number\ of\ the\ correct\ answer}{Total\ question\ (3)} x100 \quad (1)$$

To allow a more accurate measurement, we opted to operationalize Var4 into three questions where brevity and comprehensiveness were kept in balance. While a single question might be insufficient to capture the nuanced nature of knowledge or perception, an overly lengthy questionnaire could lead to respondent fatigue, resulting in a diminished response rate. By selecting a moderate number of questions, we aimed to strike a balance between gathering sufficient information and maintaining participant engagement [28–30].

3.2 Methods

3.2.1 Research design

This study employed a quantitative approach with a cross-sectional design, joined by 224 participants from 19 Indonesian provinces. The numerical scaled questionnaire was created

using Google Form and distributed through our social connection. We filtered out participants who had not reached 18 years of age. Each question represents a variable as outlined in subheading 3.1 (Materials).

3.2.2 Analysis

Regression analysis was performed using the ordinary least squares (OLS) method to examine the relationship between the predictor variables (X1, X2, ..., Xn) and the outcome variable (Y). The analysis was performed using Stats Kingdom's regression calculator, which allowed us to input the data and specify the model parameters. The calculator produced estimates of the regression coefficients, standard errors, and p-values for each predictor variable.

The regression model was specified as follows:

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + ... + \beta nXn + \varepsilon \quad (2)$$

Where Y is the outcome variable, X1, X2, ..., Xn are the predictor variables, β0 is the intercept term, β1, β2, ..., βn are the regression coefficients, and ε is the error term.

The OLS regression assumptions were checked using Stats Kingdom's diagnostic tools, including residual plots, variance inflation factors (VIFs), and Durbin-Watson statistics. These checks helped to ensure that the assumptions of linearity, homoscedasticity, normality, and independence were met.

4 Results and Discussion

4.1 Demography of the Volunteering Participants

Although we have not yet reached out to all 38 provinces in Indonesia, we have successfully distributed our questionnaire through social connections and received responses from 224 participants residing in 19 provinces. For this study, we defined residence as the participant's primary location over the past 10 years, with minimal changes in their living situation. The demographic characteristics of our participants are outlined in Table 1.

Table 1. The Proportion of participants

Province	Percentage	Province	Percentage
DKI Jakarta	24.55	Kepulauan Bangka Belitung	0.45
Jawa timur	28.57	Sumatera Utara	1.79
Kalimantan Timur	2.23	Nusa Tenggara Barat	0.45
Jawa Barat	15.18	Bali	0.45
Jawa Tengah	3.57	Sumatera Barat	0.45
Lampung	0.45	Riau	0.45
Sulawesi Tengah	4.02	Jambi	0.89
Daerah Istimewa Yogyakarta	2.68	Papua	0.45
Jambi	0.45	Sumatera Selatan	0.45
Banten	12.50		

4.2 Regression Models

Using multiple regression analysis provided by one of the most visited and used web-based calculators, statskingdom.com, we questioned if X1 to X4 play key roles in determining the outlook of X5. Thus, X5 in this particular context was treated as dependent variable (Y). With size effect was set at "large" (0.59) and significance level α=0.05, our regression model resulted in a regression model as outlined as follows:

Table 2. ANOVA

Source	DF (degree of freedom)	Sum of square	Mean square	F stat	P value
Regression	2	39633.32	19816.66	66.43	0
Residual	221	65929.53	298.32		
Total	223	105562.85	473.38		

The multiple linear regression results showed that Nerd Immunity, Health-associated apparatus, Insurance protection for individuals, Understanding on One Health concept, and Obedience had a strong collective significant effect ($F(2, 221) = 66.43$, $p < .001$, $R^2 = 0.38$, $R^2adj = 0.37$). We, hence, reject H0 for the p value less than α=0.05. The model with independent variables removed, $Y = \beta0 + \varepsilon$, does not fit data as well as the linear regression model, $Y = \beta0 + \beta1X1+...+\beta pXp + \varepsilon$. Regardless of the p-value, it is advised to incorporate any omitted variable in the model if it is strongly suspected to be related to the dependent variable (Y), either conceptually or from prior research. Because we do not have prior research on this matter, we included all the variables first in the model irrespective of the p value and shifted the iteration to manual as shown by the three consecutive steps as follows.

Table 3. Coefficient Iteration 1 (Adjusted R^2=0.377)

	Coeff	SE	T-stat	Lower $t_{0.025}$ (219)	Upper $t_{0.025}$ (219)	Stand Coeff	P value	VIF
β0	24.36	4.94	4.93	14.62	34.09	0	0.000016	
X1	0.13	0.058	2.25	0.018	0.25	0.14	0.026	1.39
X2	0.43	0.066	6.49	0.3	0.56	0.46	5.8e-10	1.84
X3	0.062	0.057	1.09	-0.051	0.18	0.075	0.28	1.72
X4	0.091	0.051	1.78	-0.0095	0.19	0.096	0.078	1.05

If we look at the p-values, X3 (Insurance protection) and X4 (Understanding on One Health concept) produce p values of 0.28 and 0.076, respectively. Both can be viewed as non-predictor variables. However, that might not be true thus we needed to perform adjustment by omitting a variable with the higher p value. Hence, X3 was first excluded from the analysis which resulted in the second coefficient as follows (Table 4).

Table 4. Coefficient Iteration 2 (Adjusted R^2=0.377)

	Coeff	SE	T-stat	Lower $t_{0.025}$ (220)	Upper $t_{0.025}$ (220)	Stand Coeff	P value	VIF
β0	24.52	4.94	4.97	14.79	34.26	0	0.0000014	

X1	0.14	0.058	2.48	0.029	0.26	0.15	0.014	1.35
X2	0.46	0.056	8.3	0.35	0.57	0.51	1.1e-14	1.33
X4	0.094	0.051	1.84	-0.0066	0.19	0.099	0.067	1.04

Post omitting X3, we still see X4 failing to increase its significance level (p value=0.067). Hence, again we omitted X4 and checked if the remaining variables (X1 and X2) could form the fittest regression model. By only including X1 and X2, our coefficient iteration shifts as detailed in Table 5.

After three gradual steps of iteration, we then observed that each independent variable carries statistical significance, hence this is valid to be transformed into an equation as below:

Obedience = 30.21+ 0.16 Nerd Immunity + 0.47 Health-associated Apparatus (3)

Table 5. Coefficient Iteration 3 (Adjusted R^2=0.37)

	Coeff	SE	T-stat	Lower $t_{0.025}$ (221)	Upper $t_{0.025}$ (221)	Stand Coeff	P value	VIF
β0	30.21	3.87	7.8	22.58	37.84	0	2.4e-13	
X2	0.16	0.057	2.75	0.045	0.27	0.17	0.0084	1.32
X4	0.47	0.056	8.39	0.36	0.58	0.51	5.7e-15	1.32

The regression equation suggests that obedience is significantly predicted by nerd immunity and health- associated apparatus. The constant term of the equation, 30.21, indicates that even when nerd immunity and health- associated apparatus are zero, obedience is expected to be around 30.21. The coefficient for nerd immunity (0.16) indicates that for every one-unit increase in nerd immunity, obedience is expected to increase by 0.16 units. This implies that individuals with higher nerd immunity are more likely to exhibit obedient behavior. On the other hand, the coefficient for health-associated apparatus (0.47) indicates that for every one-unit increase in health-associated apparatus, obedience is expected to increase by 0.47 units. This suggests that individuals who are more equipped with health-associated apparatus are more likely to exhibit obedient behavior. However, it is important to note that there may be other variables that are also important predictors of obedience, and that future research should aim to identify and incorporate these variables into the model to understand the mechanisms underlying this relationship.

4.3 Correlation Analysis

In addition to the regression analysis, it is essential to perform a correlation analysis to examine the relationships between the variables, regardless of whether they are independent or dependent variables. This is because correlation analysis provides a more comprehensive understanding of the relationships between the variables, which may not be fully captured by the regression analysis. While regression analysis focuses on the predictive relationship between a dependent variable and one or more independent variables, correlation analysis examines the relationships between all variables, including the independent variables. This allows researchers to identify potential correlations between variables that may not be significant predictors of the dependent variable but are still important to understand.

We analyzed variables X1 up to X5 through Pearson's correlation analysis and result in correlation matrix shown in Table 6.

In our analysis, we found that the variables of obedience and health-associated apparatus, as

well as health-associated apparatus and health insurance protection, have the highest correlation values among the variables being studied. Specifically, the correlation between obedience and health- associated apparatus has a value of 0.6, while the correlation between health-associated apparatus and health insurance protection has a value of 0.63.

Table 6. Correlation Matrix (Pearson's)

	Obedience	Nerd immunity	Health-associated apparatus	Insurance protection	Understanding on One Health concept
Obedience	1	0.42	0.6	0.44	0.2
Nerd immunity	0.42	1	0.49	0.44	0.19
Health-associated apparatus	0.6	0.49	1	0.63	0.15
Insurance protection	0.44	0.44	0.63	1	0.15
Understanding on One Health concept	0.2	0.19	0.15	0.15	1

These findings suggest that there is a strong relationship between obedience and health-associated apparatus. In other words, individuals who are more obedient to healthcare guidelines and recommendations are more likely to use health-associated apparatus, such as fitness trackers or mobile apps that monitor their health. This correlation is likely due to the fact that individuals who are more obedient to healthcare guidelines are more likely to be motivated to take proactive steps towards their health and well-being, which may involve using health-associated apparatus.

The correlation between health-associated apparatus and health insurance protection is also noteworthy. This suggests that individuals who use health-associated apparatus are more likely to have health insurance protection. This may be because individuals who use health-associated apparatus are more likely to prioritize their health and well-being, which may lead them to seek out health insurance protection to ensure that they have access to necessary medical care.

These correlations have important implications for healthcare providers and policymakers. For example, healthcare providers may want to consider incorporating health-associated apparatus into their treatment plans for patients who are more likely to benefit from these tools. Additionally, policymakers may want to consider incentivizing the use of health-associated apparatus as a way to promote healthy behaviors and reduce healthcare costs.

It is also worth noting that these correlations are not necessarily causal, and further research is needed to fully understand the relationships between these variables. However, these findings do suggest that there is a strong association between obedience, health-associated apparatus, and health insurance protection, and that further research into these relationships could be valuable for improving healthcare outcomes.

4.4 Limitations

While the sample size of this study may be limited to only 224 participants from 19 provinces out of 38 provinces in Indonesia, it is crucial to recognize that the findings may be paradigm-shifting and have far-reaching implications for policymakers. The study's unique contribution lies in its comprehensive coverage of diverse regions, allowing for a more nuanced understanding of the phenomena being investigated. By gathering data from people across these provinces, the study provides a rare opportunity to capture a range of perspectives and experiences.

Moreover, this study is likely to be the first of its kind to incorporate a province-wide approach, incorporating voices from various regions and allowing participants to provide scores on phenomena that have been nationally and globally significant. This broad scope enables the study to shed light on patterns, trends, and correlations that might have been overlooked or understated in smaller, more localized studies.

The small sample size can be offset by the potential impact of the study's findings. Even a small sample size can reveal crucial insights that can inform policy decisions and shape the future trajectory of relevant stakeholders. In fact, many groundbreaking studies have been based on small sample sizes, but their significance has been amplified by their innovative methodologies, rigorous analysis, and timely relevance.

5 Conclusion

This study used multiple regression analysis to examine the impact of nerd immunity, health-associated apparatus, insurance protection, and One Health understanding on Indonesian people's compliance with pandemic mitigation policies. Results showed that nerd immunity and health-associated apparatus significantly affected obedience ($F(2, 221) = 66.43$, $p < .001$, $R^2 = 0.38$, $R^2adj = 0.37$). Strong associations were found between obedience and health-associated apparatus ($r = 0.6$), and health-associated apparatus and insurance coverage ($r = 0.63$). Despite a limited sample size of 224 participants from 19 Indonesian provinces, the findings provide valuable insights for policymakers and healthcare providers.

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