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Socio-demographic segmentation in sanitation based engagement in Koja, Jakarta

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Article Info

ABSTRACT

Urban public health initiatives rely heavily on community participation to ensure success and sustainability. This study explores the socio-demographic determinants of community engagement in the public health initiatives of Koja Subdistrict, Jakarta. A cross-sectional survey was conducted, employing both qualitative interviews and quantitative questionnaires to gather data from a representative sample. Binary logistic regression was used to analyze the data, focusing on aesthetics, public health sanitation performance, community socialization, gender, age, and education. The findings reveal that aesthetic considerations, perceived sanitation performance, socialization practices, and demographic factors significantly influence the willingness to participate. Aesthetics and community socialization positively impacted engagement, while perceived high sanitation performance paradoxically discouraged individual participation. Furthermore, demographic factors such as gender, age, and education level showed varying degrees of influence, with gender disparities and higher education correlating with increased engagement. This study contributes to understanding public health participation dynamics and offers insight into designing tailored community engagement strategies. Policymakers and health officials can leverage these insights to effectively enhance community involvement and address public health challenges.

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1. INTRODUCTION

Koja Subdistrict in Jakarta grapples with a range of urban development challenges, public health concerns, social dynamics, and infrastructural hurdles [1]–[3]. These challenges include managing communicable diseases, ensuring adequate sanitation, and implementing effective waste management systems. Such urban development issues are exacerbated by the diverse socio-economic statuses and educational levels within the community, which can lead to varied health outcomes and levels of engagement in public health initiatives. In Jakarta, the pressure on public health infrastructure is immense, as the city contends with the dual challenges of a burgeoning population and the need for extensive public health services [4]. This environment makes it imperative to actively involve the community in health initiatives, particularly those that are preventive in nature. However, the success of these initiatives is heavily dependent not just on their design and execution

but also on the willingness of the community to participate and commit to these health measures [3], [5], [6]. Given these complexities, there is a pressing need to understand the factors that encourage or impede community engagement in public health initiatives. Urban centers like Jakarta are often at the forefront of public health crises [7], largely due to their dense populations and resulting strain on public health infrastructure. In recent years, the city has seen numerous public health initiatives aimed at improving its citizens' overall health and wellbeing [8], [9].

Koja Subdistrict in north Jakarta is characterized by a unique intermingling of traditional community bonds and the pressures of modern urban life. This combination significantly shapes how residents perceive and engage with public health initiatives. To effectively address the public health challenges in Koja, initiatives are specifically designed to meet the local needs, with a particular focus on enhancing sanitation services. These initiatives are crafted to account for Koja's unique urban dynamics and the specific socio-economic and infrastructural realities of the community. By tailoring these programs to fit the distinct profile of Koja, they become not only theoretically sound but also practically applicable, ensuring real-world viability and effectiveness. Such a targeted approach is vital as it directly responds to the particular challenges faced by Koja's residents and leverages their readiness to engage in improving their communal health outcomes.

The aesthetic value of public spaces and health facilities is a significant consideration. Research indicates that visually appealing and well-maintained environments are more likely to foster public engagement [10], [11]. This is particularly relevant in urban areas where green spaces and clean, orderly environments can influence residents' quality of life and willingness to engage in community activities. Another critical factor is the perceived performance of public health sanitation. Effective sanitation services prevent disease and promote public health [12], [13]. Still, the perceived performance of these services can either motivate or dissuade community involvement. If the public perceives the sanitation services as adequate, they may feel their participation is unnecessary, leading to lower engagement levels. Community socialization, defined as the degree to which community members engage with each other around health initiatives [14], [15] can significantly impact participation. Community-based sanitation programs often rely on local engagement and the sense of ownership from this socialization [16], [17]. These programs can be more successful when they foster strong community ties and collective responsibility [18].

Demographic variables also play a crucial role in public health engagement. Gender has been shown to influence participation, with women often facing more barriers to engagement due to societal roles and responsibilities [19]. Age is another factor, with different age groups having varying preferences and opportunities for participation. Younger individuals may prefer digital engagement platforms, while older community members may favor more traditional forms of participation. Finally, education levels can profoundly affect engagement [20], with higher levels of education correlating with increased awareness and self-efficacy in health-related activities. Given this complex array of factors, the research aimed to empirically investigate these variables' effects on willingness to participate in public health initiatives in Koja Subdistrict. The study's findings are intended to provide actionable insights for policymakers and public health officials to design more effective community engagement strategies. By understanding the nuances of what drives or hinders community participation, interventions can be tailored to meet the unique needs of the Koja population, ultimately leading to improved public health outcomes and a stronger, more resilient community.

While previous studies have extensively explored the interplay between socio-demographic factors and public health initiatives, there remains a discernible gap in literature specific to urban environments experiencing rapid development and change [21]–[23] such as Koja Subdistrict in Jakarta. Many studies tend to generalize findings without accounting for the nuanced dynamics of densely populated urban areas that are under significant infrastructure strain [21]–[25] such as Koja Subdistrict in Jakarta. Furthermore, while the impact of socio-economic status on public health engagement has been well-documented [21]–[23] less attention has been given to how the aesthetic value of the environment and localized perceptions of public health services, such as sanitation, affect community participation in such settings. Most existing research also tends to overlook the intricate relationship between individual demographic factors and specific types of public health initiatives. For instance, the varying degrees of engagement among different age groups and genders in response to sanitation improvements remain under-examined. Additionally, there is a scarcity of literature that addresses the paradoxical influence of perceived high sanitation performance on community engagement [26], [27] which suggests that satisfactory public services might reduce the perceived need for individual participation.

This study seeks to address these gaps by focusing on the socio-demographic factors that either facilitate or impede community engagement in public health initiatives within Koja Subdistrict. By pinpointing specific socio-demographic elements that affect participation in health initiatives, particularly those related to sanitation, this research aims to provide a deeper understanding of public health dynamics in urban settings. The intent of this study is to enhance public health strategies through increased community involvement, thereby improving health outcomes and promoting a proactive public health culture in Koja.

2.   METHOD

In this research, an extensive literature review laid the groundwork, meticulously piecing together the theoretical constructs underpinning the investigation into public health initiative participation in Koja Subdistrict, Jakarta. The literature synthesized a range of studies to develop robust hypotheses focused on aesthetics, sanitation performance, socialization, and demographic influences on community engagement. Upon establishing the theoretical framework, the research design was carefully shaped to be descriptive and analytical, blending qualitative insights with quantitative rigor. The design aimed to explore the multifaceted nature of community participation, capturing the nuanced interplay between environmental factors and individual characteristics. Data collection spanned from February to June 2022, with researchers conducting face-to-face interviews and administering questionnaires. The interviews allowed for an in-depth understanding of individual perspectives, while the questionnaires provided structured data that could be analyzed quantitatively. The face-to-face approach not only facilitated a higher response rate but also ensured that participants fully understood the questions, thus enhancing the reliability of the data. Upon completion of data collection, the data was rigorously processed. Interview responses were transcribed and coded using thematic analysis to identify common themes and patterns. The quantitative data from the questionnaires were entered into the SPSS software, coded appropriately for the subsequent factor analysis and binary logistic regression modeling. Factor analysis was employed as a key analytical technique to identify latent constructs within the data, potentially explaining the observed correlations between variables [28]–[32]. This method was crucial for reducing the dimensionality of the data set, enabling a clearer understanding of the underlying factors that might influence the willingness to participate in public health initiatives.

This study utilizes a sample size of 396 individuals from the Koja Subdistrict, which boasts a population of 337,685. This sample size was strategically chosen to ensure a margin of error of 5%, striking a balance between statistical accuracy and practical considerations. A 5% margin of error is standard in social science research, providing a reliable level of precision without necessitating an impractically large sample size. This approach ensures that the study's findings are both statistically significant and relevant to policymakers and health professionals seeking to enhance public health strategies through increased community involvement. By employing a sample size that offers a credible snapshot of the community's attitudes and behaviors, the research is poised to provide actionable insights that can be leveraged to improve health outcomes and engagement in Koja and similar urban environments.

Following factor analysis, binary logistic regression models were created within SPSS to test the hypotheses. This statistical method was chosen to examine the relationship between a binary dependent variable and one or more independent variables. Each hypothesis was scrutinized, with the regression model providing insight into the predictive power of each variable. In constructing the regression models, a margin of error of 5% was adopted, denoting the confidence level within which the true values for the population were estimated to fall. This included the Hosmer-Lemeshow test to assess the fit of the logistic regression models and the examination of the omnibus test of model coefficients to check the overall significance of the models. The final stage of the research involved a rigorous discussion relating the findings to existing literature and theory, offering a detailed interpretation of the results within the broader context of public health participation as shown in Table 1.

Table 1. Hypothesis development

No	Hypothesis	Reference
1	H1: Importance of aesthetics and willingness to participate	The attractiveness of public health initiatives, including sanitation efforts, can positively influence public engagement. Aesthetically pleasing environments have increased community involvement and participation in public services.
2	H2: Public health sanitation performance and willingness to participate	Effective public health sanitation performance might decrease the perceived need for individual contribution if the services are seen as adequate or surpassing standards, potentially reducing the willingness to participate.
3	H3: Socialization of community-based sanitation performance and willingness to participate	Higher levels of social interaction and community engagement within sanitation programs are often linked to increased participation due to a greater sense of community ownership and responsibility.
4	H4: Socialization of sanitation treatment facilities and willingness to participate	Like community-based sanitation, socialization concerning sanitation treatment facilities is expected to influence willingness to participate positively. When people are involved in discussions and activities around treatment facilities, they may feel more invested and thus more likely to engage.
5	H5: Gender and willingness to participate	Gender differences in participation are well documented, with women often facing more significant barriers to engagement due to societal roles or other responsibilities. Addressing these barriers can lead to increased participation among women.
6	H6: Age and willingness to participate	Younger individuals may have different approaches to engagement, often preferring informal or digital means of participation. Their willingness to participate may vary based on how initiatives align with these preferences.
7	H7: Education and willingness to participate	Educational attainment is consistently linked with higher civic engagement. Individuals with higher education levels, such as a bachelor's degree or above, are likely to be more willing to participate due to increased awareness and efficacy.

Table 2 presents an overview of the key variables utilized in the regression analysis of our study, with detailed descriptions to ensure clarity in their application and interpretation. This serves as a guide to the operational definitions, types, and measurement methods of each variable, thereby providing the necessary context for understanding how these variables are coded and analyzed in relation to community engagement in public health initiatives within Koja Subdistrict, Jakarta. Logistic regression was selected as the analytical method for this study due to its robustness in examining relationships between a binary dependent variable and one or more independent variables. The dependent variable of interest, community engagement in public health initiatives, is categorical and not normally distributed; therefore, logistic regression is the appropriate choice as it does not assume a linear relationship, nor does it require the independent variables to be normally distributed. Furthermore, logistic regression allows us to estimate the odds of participation in public health initiatives based on predictor variables such as socio-demographic factors. It is particularly advantageous in handling binary outcomes like the willingness to participate (yes/no), and it provides the flexibility to include both continuous and categorical variables.

Table 2. Definition of variables used in regression analysis

Variable name	Description	Type of variable	Measurement/coding
Aesthetic importance (H1)	This variable assesses the impact of the visual appeal of public health initiatives on community engagement.	Dummy Variable	Coded as 0 or 1 based on a Likert scale from 1-5, where 1 indicates 'not important' and 5 indicates 'very important'.
Sanitation performance (H2)	Reflects the community's perception of the effectiveness of public health sanitation services.	Dummy Variable	Coded as 0 or 1 based on a Likert scale from 1-5, with higher scores indicating better perceived performance.
Socialization in sanitation (H3 and H4)	Measures the level of community interaction and collective action regarding sanitation programs.	Dummy Variable	Coded as 0 or 1 based on a Likert scale from 1-5, where higher scores reflect greater community socialization.
Gender (H5)	The gender of the participant.	Variable	Coded as 1 for female and 0 for all other genders.
Age group (H6)	The age category of the participant.	Variable	Coded as 1 for individuals younger than 29 years, and 0 for 29 years and older.
Education level (H7)	The highest education level attained by the participant.	Variable	Coded as 1 for participants with at least a bachelor's degree, and 0 for those with lower levels of education.

3. RESULTS AND DISCUSSION

Table 3 provides a detailed breakdown of the relationship between various socio-demographic variables and the willingness to participate in public health initiatives among Koja Subdistrict, Jakarta residents. Gender differences are notable, with females showing a significantly higher willingness to participate (49.44%) compared to males (39.49%). This is statistically significant (p=0.008), indicating a gender-based participation rate disparity. Age groups are categorized into '20-29' and '≥29,' with the latter showing a higher proportion of willingness to participate (25.76%). The marginal significance (p=0.032) suggests that older individuals may be slightly more inclined to participate than younger individuals. Educational attainment is another key variable, with individuals holding at least a bachelor's degree showing the highest willingness to participate (60.10%). This is statistically significant (p=0.002), affirming that higher education levels are positively correlated with participation willingness. Occupation, divided into 'Non-Formal' and 'Formal,' shows that individuals with formal employment are more willing to participate (57.07%), although the relationship is marginally non-significant (p=0.038). Lastly, income levels, split between '<Minimum Wage' and '≥Minimum Wage,' reveal a significant correlation with willingness to participate. Those earning at least the minimum wage are more likely to participate (27.77%), with a significant p-value of 0.008, suggesting that financial security might facilitate greater engagement in public health initiatives.

Table 4 presents the results of a binary logistic regression model that analyzes the impact of various predictors on the willingness to participate in public health initiatives. The "Importance of Aesthetic" variable and others like it are utilized within the logistic regression as they are, maintaining their 1-5 Likert scale values. In this context, the logistic regression interprets these values not as binary, but as ordinal data. This means that the variables enter the model with the assumption that higher numbers on the scale correspond to greater degrees of the measured attribute, such as aesthetic importance or perceived sanitation performance. The coefficients for these Likert-scale variables in the regression analysis indicate the expected change in the log odds of willingness to participate for a one-point increase in the Likert score. A positive coefficient implies that higher scores on the scale are associated with an increased likelihood of participation, whereas a negative coefficient suggests the opposite. By retaining the full range of the Likert scale in the analysis, the model captures the varying levels of intensity in respondents' attitudes or perceptions and their impact on willingness to participate. This treatment of Likert scale responses allows for a more detailed and

graded analysis of the influence that each of the socio-demographic factors has on public health engagement. Model fit statistics are also provided. The model correctly predicts the outcome 84.10% of the time. The -2 Log likelihood (299.998) indicates the model's fit, with lower values generally indicating a better fit. The Cox & Snell and Nagelkerke R square values provide an indication of the amount of variance in the dependent variable explained by the model, with values of 0.112 and 0.192, respectively, suggesting that the model explains a reasonable proportion of the variance in willingness to participate.

Table 3. Comparative of respondent variables for willingness to participate

Variable	Level	no-WTP*		yes-WTP*		Person Chi-square	p-value
Gender	Male	18	4.55%	155	39.14%	6.958	0.008
	Female	45	11.36%	178	44.95%		
Age	20-29	35	8.84%	231	58.33%	4.584	0.032
	>29	28	7.07%	102	25.76%		
Education	Bachelor's degree below	57	14.39%	238	60.10%	10.071	0.002
	Bachelor above	6	1.52%	95	23.99%		
Occupation	Non-formal	51	12.88%	226	57.07%	4.315	0.038
	Formal	12	3.03%	107	27.02%		
Income	<Minimum wage	53	13.38%	225	56.82%	6.945	0.008
	≥Minimum wage	10	2.53%	108	27.27%		

*WTP: willingness to participate

Table 4. Binary logistic model for willingness to participate

Variables in the equation	B	S.E.	Wald	df	Sig.	Exp(B)
Importance of aesthetic (dummy variable, Likert scale 1-5)	0.378	0.16	5.592	1	0.018	1.459
Public health sanitation performance (dummy variable, Likert scale 1-5)	-0.408	0.181	5.06	1	0.024	0.665
Socialization of community-based sanitation performance (dummy variable, Likert scale 1-5)	0.427	0.194	4.866	1	0.027	1.533
Socialization of sanitation treatment facilities (dummy variable, Likert scale 1-5)	-0.662	0.181	13.409	1	0	0.516
Gender (1=Female, otherwise=0)	-0.795	0.321	6.144	1	0.013	0.452
Age (1=younger than 29-year-old, otherwise=0)	-0.688	0.307	5.023	1	0.025	0.502
Education (1=bachelor's degree above, otherwise=0)	1.229	0.462	7.068	1	0.008	3.418
Constant	3.136	0.79	15.77	1	0	23.018
Percentage correct			84.10%			
-2 Log likelihood			299.998			
Cox & Snell R square			0.112			
Nagelkerke R square			0.192			

The 'importance of aesthetic' has a statistically significant positive effect on the willingness to participate, confirming hypothesis H1 from Table 1 that aesthetic factors influence public engagement. This is consistent with existing literature suggesting that aesthetically pleasing environments can enhance public participation in health initiatives [33]. The odds ratio further validates the positive relationship between aesthetics and participation willingness. Conversely, 'Public Health Sanitation Performance' is negatively associated with willingness to participate, potentially challenging hypothesis H2. The negative coefficient suggests that higher perceived performance might lead to complacency. However, this finding does corroborate their suggestion that perceived adequacy of sanitation performance can reduce the impetus for personal engagement, thus offering a complex validation of H2. 'Socialization of Community-Based Sanitation Performance' has a positive impact, supporting hypothesis H3 from Table 1 that socialization of community-based sanitation is linked to increased participation [17], [34], [35]. The odds ratio of 1.533 aligns with the assertion that community ownership fosters engagement. The negative coefficient for 'Socialization of Sanitation Treatment Facilities' contradicts hypothesis H4. This could suggest an inverse relationship where increased socialization may be associated with decreased participation, perhaps due to factors not captured in the initial hypothesis, such as social barriers or misconceptions about the facilities.

Gender, coded as '1' for females, shows a significant negative correlation with willingness to participate, supporting hypothesis H5 and the literature suggesting that women may face more significant barriers to participation [36]. The lower odds ratio for females indicates that gender differences are indeed an influential factor in participation, which requires further investigation into the specific barriers women face. Age, with younger individuals being less likely to participate, validates hypothesis H6. This finding is supported by other studies [37], who noted that willingness to participate through informal or digital means varies with age, and younger individuals might prefer different forms of engagement. Finally, the education level, particularly a bachelor's degree or above, is a significant positive predictor, validating hypothesis H7. This aligns with [38], [39] who found that higher education levels are associated with greater participation

due to increased awareness and self-efficacy. The findings of this research provide several insights that can be translated into policy recommendations for increasing public engagement in health initiatives in Koja Subdistrict, Jakarta. Given the significance of aesthetics, as shown by the positive association with the willingness to participate, policymakers should consider investing in the aesthetic aspects of public health facilities and initiatives. Enhancing public health interventions' visual appeal could lead to increased community engagement. The unexpected negative association between public health sanitation performance and willingness to participate suggests that residents might perceive that their involvement is less necessary when performance is deemed adequate. To counteract this, communication strategies should emphasize the ongoing need for community involvement [40] regardless of current performance levels, to sustain and improve public health outcomes.

The role of socialization in community-based sanitation points to the importance of fostering a sense of community ownership and involvement. Policies should facilitate community meetings, workshops, and social activities encouraging collective participation in sanitation programs [41]–[43]. However, the negative correlation between socialization of sanitation treatment facilities and willingness to participate indicates a potential need to reevaluate how the community presents and perceives these facilities. Efforts should be made to address possible misconceptions and to promote positive social norms around these facilities [44]. Moreover, the significant positive impact of education on willingness to participate highlights the need for educational programs that inform and empower residents to participate in public health initiatives. Strategies could include educational campaigns that promote health literacy and the development of community health ambassadors with higher education levels to lead and motivate others.

The study's findings highlight several strategies for enhancing public health initiatives in Koja Subdistrict. First, improving the visual appeal and functionality of public spaces could increase community engagement in health programs. Policies should focus on beautifying and optimizing public health facilities to make them more inviting. Despite the high performance of public health sanitation, it's crucial to maintain continuous community involvement. Communication strategies should stress the ongoing need for community participation to sustain and enhance public health outcomes. Promoting community meetings and workshops can strengthen social ties and collective responsibility toward public health, encouraging more active participation in sanitation efforts. Addressing misconceptions around sanitation treatment facilities is also necessary. Information campaigns and community dialogues could help improve public perceptions and increase engagement. Tailoring engagement strategies to meet the specific barriers and preferences of different demographic groups, such as women and younger people, might include more inclusive activities and digital engagement methods. Enhancing educational opportunities related to health can empower residents to participate more actively, promoting public health literacy and developing community health ambassadors, especially those with higher education levels. These actions aim to foster a proactive public health culture in Koja, ultimately improving health outcomes through increased community participation.

4.   CONCLUSION

The conclusion of this study underscores the complex interplay of socio-demographic factors that influence community engagement in public health initiatives in Koja Subdistrict, Jakarta. The empirical analysis revealed that aesthetic appeal and the socialization of community-based sanitation are significant positive predictors of public participation. Contrary to expectations, higher perceived sanitation performance was associated with decreased willingness to participate, suggesting that an apparent success could lead to public complacency. Gender emerged as a critical factor, with women displaying lower participation rates, highlighting the need for gender-sensitive approaches in public health strategies. Furthermore, age and education were significant determinants of participation. Older individuals and those with higher educational attainment were more likely to engage in public health initiatives, pointing to the need for age-appropriate engagement strategies and the importance of leveraging educational institutions for public health advocacy. This research contributes valuable insights into the dynamics of public health engagement, suggesting that effective public health strategies should address not only the physical infrastructure but also foster an environment conducive to social inclusion and community empowerment. For policymakers and health practitioners, the findings advocate for a multifaceted approach to designing and implementing public health interventions sensitive to the community's aesthetic, social, and demographic nuances.

of each institution have facilitated a thorough and rigorous exploration of the socio-demographic factors affecting public health initiatives in Koja Subdistrict, Jakarta.

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