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Chi-Square Analysis of the Percentage of the Bottom 40% Expenditure Group Aged 0–17 Years with Birth Certificate Ownership in Indonesia

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ABSTRACT

This study investigates the relationship between household expenditure levels and birth certificate ownership among children aged 0–17 years in Indonesia. Using secondary data from *Rodem Pusat Statistik* (BPS) for the period 2015–2017, the research applies the Chi-Square test of independence (contingency table analysis) to determine whether children from the bottom 40% expenditure group are less likely to possess birth certificates compared to other groups. The results show that the Chi-Square value ($\chi^2 = 0.019174$) at a 5% significance level indicates no statistically significant association between household expenditure group and birth certificate ownership. This finding suggests that efforts by the Indonesian government to improve civil registration may have contributed to reducing inequality across income groups. Despite this, regional and intra-level disparities may still persist. The study highlights the importance of continuous policy interventions, awareness programs, and integrated registration services to ensure universal birth certificate coverage for all children in Indonesia.

Keywords: Chi-Square Test; Birth Certificate Ownership; Expenditure Group; Civil Registration; Indonesia; Child Rights; Socioeconomic Inequality

Field: Social Statistics; Demography; Public Policy; Development Studies; Social Protection; Accounting for Public Sector Data

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SDG's: No Poverty (1); Reduced Inequalities (10); Quality Education (4)

Specific SDG's: By 2030, provide legal identity for all, including birth registration (36.9)

INTRODUCTION

Population data plays a crucial role in the formulation of social, economic, and development policies. One important demographic indicator is the ownership of birth certificates, which serves as a legal identity document and provides children access to education, health, and social protection services (Renaldi, Aadi, et al., 2023). In Indonesia, birth certificate ownership is not only a matter of civil rights but also a fundamental requirement to ensure equal opportunities for every child (Renaldi, Sudarno, et al., 2021).

However, disparities still exist in birth certificate ownership, particularly among children from lower-income households (Renaldi, Suhardjo, Putri, Sevendy, et al., 2021). The bottom 40% expenditure group represents a vulnerable segment of the population that often faces barriers in accessing civil registration services. These barriers may include lack of awareness, administrative complexity, and financial constraints. As a result, children from this group are at a higher risk of being excluded from essential public services.

To better understand this issue, statistical analysis is necessary to examine whether socioeconomic status has a significant relationship with birth certificate ownership. This study applies the Chi-Square test (contingency table analysis) to analyze the percentage of children aged 0–17 years within the bottom 40% expenditure group in Indonesia who possess birth certificates. By employing this method, the study aims to determine whether there is a statistically significant association between household expenditure level and birth certificate ownership.

The results of this analysis are expected to provide insights into the effectiveness of government policies on civil registration and highlight the areas that require targeted interventions. Furthermore, the findings may serve as an evidence base for policymakers to design strategies that reduce inequality and ensure that every child in Indonesia enjoys the right to legal identity.

LITERATURE REVIEW

Population and Demographic Indicators

Population studies provide essential insights for policymakers in formulating social, economic, and public welfare programs. According to BPS (Statistics Indonesia), population data includes demographic characteristics such as age, marital status, place of birth, and legal identity documentation. Children aged 0–17 years are a crucial demographic group because they represent the future human capital of the nation. Proper documentation, particularly the possession of a birth certificate, is necessary to ensure their access to education, healthcare, and legal protection.

Birth Certificate Ownership and Civil Rights

A birth certificate is a fundamental civil registration document that proves a person's legal identity. UNICEF (2019) emphasizes that birth registration is a universal human right, essential for safeguarding children against exploitation, child marriage, and exclusion from social services. In Indonesia, government programs have sought to improve coverage, but significant disparities remain. Studies indicate that children from low-income households are less likely to have a birth certificate compared to those from wealthier families, due to limited awareness, bureaucratic obstacles, and costs associated with registration (Yusrinal et al., 2021).

Socioeconomic Status and the Bottom 40% Expenditure Group

Socioeconomic conditions are often measured through household expenditure levels, which reflect the ability of a household to meet basic needs. The bottom 40% expenditure group is widely used as a proxy for poverty and vulnerability in Indonesia. Children in this group are more likely to face barriers in obtaining civil registration due to limited access to information, distance from registration offices, and financial limitations. Research by (Nyoto et al., 2023) highlights that poverty is strongly correlated with lower levels of birth certificate ownership, which perpetuates cycles of inequality.

Statistical Methods for Analyzing Relationships

To examine the association between socioeconomic factors and birth certificate ownership, statistical methods are required. The Chi-Square test of independence (χ^2 test) is a non-parametric statistical method used to determine whether there is a significant relationship between two categorical variables (Suhardjo et al., 2023). In this study, the Chi-Square test is applied to analyze contingency tables constructed from data on household expenditure groups and birth certificate ownership. This method allows researchers to evaluate whether differences observed in proportions are statistically significant or due to chance.

Previous Studies

Several studies have employed statistical analysis to investigate civil registration and poverty. For instance, (Rinaldi, Hafid, et al., 2022) applied the Chi-Square test to examine disparities in child health access among income groups, finding significant associations. Similarly, (Rinaldi, Saharti, et al., 2022) reported that although birth certificate ownership has improved nationally, gaps remain between urban and rural areas as well as across income levels. These findings underline the importance of statistical approaches in identifying and addressing inequalities in social policy outcomes.

Based on the reviewed literature, it is clear that birth certificate ownership is influenced by socioeconomic conditions, particularly among the bottom 40% expenditure group. The Chi-Square method provides a suitable analytical tool to test the relationship between household expenditure level and child birth certificate ownership. This study builds upon existing research by focusing specifically on the 0–17 age group in Indonesia and aims to provide empirical evidence for policy improvement.

METHODOLOGY

Research Design

This study uses a quantitative research design with a descriptive and inferential approach (Sekaran & Bougie, 2016). The primary objective is to examine the relationship between household expenditure level (bottom 40% group) and birth certificate ownership among children aged 0–17 years in Indonesia. The Chi-Square test of independence is employed as the main statistical method to analyze categorical data (Lind et al., 2018).

Data Source

The study relies on secondary data obtained from Badan Pusat Statistik (BPS), specifically data on population characteristics, expenditure groups, and civil registration (2015–2017). The data set includes percentages of children aged 0–17 years from the bottom 40% expenditure group and their status of birth certificate ownership (Renaldi et al., 2023).

Population and Sample

The population under study consists of Indonesian children aged 0–17 years. The analysis focuses specifically on the bottom 40% expenditure group, which is commonly used as an indicator of lower-income households (Arka et al., 2025). Since this study uses aggregated data from BPS, the sample corresponds to national-level statistics rather than individual respondents (Renaldi et al., 2024).

Variables

Independent Variable (X): Household expenditure group (bottom 40% vs. others). Dependent Variable (Y): Birth certificate ownership (owning vs. not owning). Control Dimension: Age category (0–17 years).

Data Analysis Technique

The analysis is conducted using the Chi-Square test of independence (χ^2 test) with a 5% significance level ($\alpha = 0.05$). This test is applied to contingency tables constructed from the data, comparing proportions of children with and without birth certificates across expenditure groups (Purmana et al., 2025).

The decision-making criteria are as follows (Sahardjo et al., 2024):

- If χ^2 calculated $>$ χ^2 table (α), reject H_0 and conclude there is a significant relationship.
- If χ^2 calculated $\leq \chi^2$ table, fail to reject H_0 and conclude there is no significant relationship.

Analytical Tools

The contingency table and Chi-Square test were computed using Microsoft Excel/Statistical software. In the uploaded study, the calculation yielded $\chi^2 = 0.0191$ ($\alpha = 5\%$), indicating that there is no significant association between the bottom 40% expenditure group and birth certificate ownership among children aged 0–17 years in Indonesia (Renaldi, 2024).

RESULTS AND DISCUSSION

Results

The Chi-Square test of independence was conducted to determine whether there is a significant association between household expenditure group (bottom 40%) and birth certificate ownership among children aged 0–17 years in Indonesia. The contingency table was constructed from BPS (2015–2017) data.

- Chi-Square calculated (χ^2): 0.019174
- Significance level (α): 0.05 (5%)
- Decision Rule: If χ^2 calculated $>$ χ^2 critical, reject H_0 ; otherwise, fail to reject H_0 .
- Result: χ^2 calculated (0.019174) $<$ χ^2 critical \rightarrow Fail to reject H_0 .

This indicates that there is no statistically significant relationship between household expenditure group (bottom 40%) and birth certificate ownership among children aged 0–17 years in Indonesia.

Discussion

The findings suggest that, during the 2013–2017 period, the likelihood of a child in the bottom 40% expenditure group owning a birth certificate did not differ significantly from that of children in other expenditure groups. This result is somewhat unexpected, as previous studies (Renaldi, Sahardjo, Putri, Javentia, et al., 2021) reported that poverty and low socioeconomic status often limit access to civil registration.

Several factors may explain this outcome:

- Government Policies and Programs: During the study period, Indonesia implemented national programs to improve civil registration coverage, such as simplifying administrative processes and integrating registration with health and education services. These efforts may have reduced the gap between income groups.

- Increased Public Awareness: Public campaigns by both government and non-governmental organizations may have improved awareness among lower-income households about the importance of birth certificates, leading to higher registration rates regardless of economic status.
- Urban-Rural Considerations: The aggregated national-level data may obscure disparities at the local level. While the Chi-Square test indicates no significant national association, regional variations (especially between urban and rural areas) may still exist, as reported by (Renaldi, Suyono, et al., 2023).
- Limitations of the Data: The study relies on secondary aggregated data, which may not capture nuances such as parental education, accessibility of registration offices, or cultural factors influencing birth certificate ownership.

Despite the statistical result, the social reality should not be overlooked. Vulnerable groups within the bottom 40% expenditure households may still face barriers to civil registration, even if the overall data show no significant difference. Therefore, continuous efforts are required to ensure universal birth certificate coverage and to address remaining hidden inequalities.

CONCLUSION

Conclusion

This study analyzed the relationship between household expenditure level (bottom 40%) and birth certificate ownership among children aged 0–17 years in Indonesia using the Chi-Square test of independence. The results showed that the Chi-Square value ($\chi^2 = 0.019174$) at a 5% significance level indicated no statistically significant association between socioeconomic status (as measured by expenditure groups) and birth certificate ownership. This finding suggests that, at the national level, children in the bottom-40% expenditure group were not systematically disadvantaged in terms of birth certificate ownership compared to other groups during the 2015–2017 period.

Implications

Policy Effectiveness: The absence of a significant association may indicate that government programs aimed at increasing birth registration have been effective in reaching lower-income households. **Equity in Access:** This finding provides encouraging evidence that access to birth certificates may be becoming more equitable across income groups. **Social Protection:** Ensuring birth certificate ownership helps protect children's rights to education, health, and legal identity, reinforcing Indonesia's commitment to Sustainable Development Goals (SDGs), particularly Goal 16.9 (legal identity for all).

Limitations

Aggregated Data: The study relies on secondary, aggregated BPS data, which may mask disparities within regions, provinces, or specific communities. **Limited Variables:** Other factors such as parental education, rural-urban location, and cultural practices were not included in the analysis. **Time Frame:** The study only covers 2015–2017, which may not reflect long-term trends or more recent developments. **Statistical Method:** While the Chi-Square test is appropriate for categorical data, it does not measure the strength of association or causal relationships.

Recommendations

Strengthen Local-Level Analysis: Policymakers should conduct more detailed analyses at the regional or district level to identify areas where disparities may still exist. **Targeted Outreach:** Programs should continue to focus on hard-to-reach populations, especially in rural and remote areas, where administrative and logistical barriers are higher. **Integrated Services:** Civil registration should remain integrated with healthcare and education services to ensure children are registered at birth. **Awareness Campaigns:** Ongoing socialization and awareness programs should be maintained to ensure parents understand the importance of birth certificates.

Future Research

Micro-Level Data: Future studies should use household- or individual-level data to capture more detailed relationships between socioeconomic status and birth certificate ownership. **Longitudinal Studies:** Examining trends over a longer period would provide insights into whether improvements in birth registration are sustainable. **Comparative Studies:** Research comparing urban vs. rural regions or across provinces could highlight hidden disparities masked by national-level data. **Expanded Variables:** Incorporating additional variables such as parental education, accessibility of registration services, and cultural attitudes could provide a more comprehensive understanding. **Policy Evaluation:** Further research could assess the direct impact of specific government programs on reducing disparities in birth registration.

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