



SIGN JOURNAL OF PUBLIC HEALTH

[E-ISSN: 2962-3723] [P-ISSN: 2962-4347]

<https://jurnal.penerbitsign.com/index.php/sjph/article/view/v4n1-005>

Vol. 4 Issue 1: January – June 2025

Published Online: June 27, 2025

Article Title

Determinants of Basic Immunization Completeness among Infants: An Analysis of Maternal Socio-Demographics, Knowledge, Attitudes, and Practices

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How to cite:

Putri, L. J., Arisani, G., & Fauziah, N. (2025). Determinants of Basic Immunization Completeness among Infants: An Analysis of Maternal Socio-Demographics, Knowledge, Attitudes, and Practices. *SIGN Journal of Public Health*, 4(1), 55-69. <https://doi.org/10.37276/sjph.v4i1.680>



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ABSTRACT

The administration of basic immunization constitutes a fundamental public health intervention in mitigating infant morbidity and mortality rates associated with Vaccine-Preventable Diseases (VPDs). Despite its pivotal role, the achievement of Universal Child Immunization (UCI) in Palangka Raya City remains fluctuating and consistently falls below national targets. This study aims to comprehensively describe the determinants influencing the status of basic immunization completeness among infants at the Independent Midwifery Practice (IMP) "W" in Palangka Raya City. A descriptive quantitative research design with an observational approach was employed. The sample consisted of 53 respondents drawn from the population using the Slovin formula, with primary data collection conducted through a calibrated questionnaire exhibiting a high reliability coefficient (Cronbach's Alpha 0.86). Data were processed using univariate statistical analysis to describe frequency distributions and proportions. The results revealed that 62.26% of infants had received complete immunization, while the remaining 37.74% were incomplete. Significant findings indicated that respondents with tertiary education, income exceeding the Regional Minimum Wage (UMP), and those with "Good" knowledge, attitude, and practice categories achieved an absolute completeness rate of 100.00%. Conversely, adolescent mothers (< 20 years) and those with primary education showed a 100.00% incompleteness rate. Geographical accessibility within a radius of < 1 km recorded higher completeness (73.68%) compared to a radius of > 2 km (55.88%), while the Dayak ethnicity demonstrated the highest completeness rate (83.33%). The study concludes that economic factors, education levels, physical accessibility, and maternal knowledge and attitudes are decisive determinants in achieving immunization status. Policy implications are directed toward strengthening personalized education and active home-visit service strategies to eliminate spatial and sociocultural barriers at the primary healthcare level.

Keywords: Attitude; Basic Immunization; Determinants; Knowledge; Socio-Demography.

INTRODUCTION

The primary global strategy for mitigating morbidity and mortality among vulnerable populations, specifically infants and toddlers, depends heavily on the success of immunization programs as a public health intervention. Immunization induces active immunity against specific pathogens and has been shown to prevent millions of deaths annually from Vaccine-Preventable Diseases (VPDs) (Tesema et al., 2020; Ismail et al., 2023). Despite the undisputable epidemiological effectiveness of vaccines, reports from various global health authorities indicate a stagnation in basic immunization coverage, with the percentage of infants failing to receive complete vaccinations remaining at an alarming level. This condition creates a substantial vulnerability gap concerning potential outbreaks of infectious diseases such as diphtheria, pertussis, tetanus, and measles in various developing countries, including Indonesia. Therefore, achieving threshold protection targets through basic immunization necessitates the full attention of all public health policy stakeholders.

In Indonesia, the success of infant health protection is measured by the government-mandated basic immunization completeness indicator, which is achieved before a child reaches one year of age. Managerially, the complete basic immunization

framework includes administering Bacillus Calmette-Guérin (BCG), Diphtheria-Pertussis-Tetanus-Hepatitis B-Haemophilus influenzae type B (DPT-HB-Hib), Polio, and Measles-Rubella (MR) vaccines (Arianggara et al., 2023). However, national aggregate data reveal a disparity between the Ministry of Health's Strategic Plan (*Renstra*) targets and the actual field implementation of basic immunization coverage (Arpen & Afnas, 2023). The consistent failure to achieve Universal Child Immunization (UCI) targets indicates that the availability of vaccine logistics in health facilities is not directly proportional to community service utilization. This phenomenon underscores the urgency of deconstructing the determinants that hinder the likelihood of maternal adherence to infant basic immunization schedules.

At the regional scale, Central Kalimantan Province presents a territory with fluctuating immunization coverage that requires measurable interventions. Based on provincial health profiles, the indicators for immunization completeness and UCI achievement in Central Kalimantan have shown a significant downward trend in percentage annually (Dinkes Kalteng, 2021). This gap becomes more pronounced when data are disaggregated to the municipal level, where Palangka Raya City is recorded as having remarkably low immunization coverage, at only 27% (Wijayanti et al., 2021). The decrease in the percentage of UCI-status sub-districts (*kelurahan*) in Palangka Raya City confirms the existence of systemic barriers and practice determinants at the grassroots level that obstruct the acceleration of this promotive and preventive health program. Demographic and epidemiological conditions at primary healthcare facilities, such as Independent Midwifery Practices (*Praktik Bidan Mandiri*), provide critical contexts for analyzing the root causes of these suboptimal immunization rates.

Theoretically, the utilization of immunization services is a manifestation of health practice modifications influenced by a set of predisposing, enabling, and reinforcing variables. Maternal education levels and employment status are consistently identified as socio-demographic determinants of the capacity to absorb health information and the time allocated to facility visits (Monica et al., 2024; Saragi et al., 2024). Additionally, maternal knowledge regarding vaccine schedules and benefits, affective attitudes, and compliance levels play an essential role in reducing resistance to immunization programs (Rahmatina & Erawati, 2021). Efforts to enhance understanding through health education have been statistically proven to restructure parental attitudes from apathy to proactivity in completing the infant immunization series (Syukri & Appi, 2021). This underscores that individual internal determinants constitute the primary foundation dictating compliance with preventive health protocols.

Beyond internal factors, external contextual determinants such as social support and geographic accessibility barriers also carry significant probabilities that cannot be overlooked (Nur'aini et al., 2024). Hardhantyo and Chuang (2021) confirmed

differences in risk determinants for incomplete immunization between urban and rural populations in Indonesia, which are closely associated with distance and access to healthcare facilities. Furthermore, the integration of sociocultural elements, including local cultural norms, religious leaders' interventions, and emotional or instrumental support from the family, has been shown to increase or decrease maternal intentions to provide immunization (Masyudi et al., 2023). The complexity of the interplay between absolute distance affordability and ethnic cultural constructions, such as the Dayak, Banjar, and Javanese, forms unique health practice patterns that demand a precise descriptive quantitative approach to map the magnitude of influence from each variable.

Despite the extensive theoretical foundation on immunization determinants, systematic reviews of prior studies reveal inconsistent findings and a substantial research gap. Several studies conclusively demonstrate that maternal education, knowledge, attitudes, and beliefs are primary predictors of basic immunization completeness (Ismail et al., 2023). However, a statistical paradox is found in other empirical literature, which reports that socioeconomic status, culture, education level, maternal knowledge, and family support are not statistically significant for basic immunization status (Riza et al., 2018; Suliawati et al., 2023; Hafid et al., 2024). Furthermore, research examining supporting intervention variables, such as family support, also shows non-significant probabilities (p-values) toward immunization fulfillment, indicating differing probabilities across various research loci (Marniati et al., 2022). These inconsistencies in classic variables, coupled with the dominance of research focusing on follow-up immunizations (Safitri & Andika, 2020; Henuck et al., 2024), create a space to re-verify these determinants within a specific population.

Building upon this gap analysis, the present study offers novelty and originality by integrating specific sociocultural variables namely the Dayak, Banjar, and Javanese ethnicities and spatial accessibility variables (distance to health facilities) into a single descriptive quantitative analysis model alongside classic practice variables (knowledge, attitudes, and practices). Unlike previous research that tends to isolate variables or focus on macro urban-rural differences, this study comprehensively examines these determinants within the primary care ecosystem at the Independent Midwifery Practice (IMP) "W" in Palangka Raya City. This approach allows for a sharper quantification of the probabilities of interactions among socio-demographic characteristics, accessibility barriers, and ethnic culture in influencing maternal understanding and infant basic immunization status in an area with critical UCI coverage rates.

Therefore, this study aims to measure and describe the determinants of basic immunization completeness among infants at IMP "W" in Palangka Raya City, using

socio-demographic factors, accessibility, and health practice modifications. The scientific contribution of this research is to provide an empirical foundation based on quantitative data for the Health Office and primary healthcare practitioners. In practice, the output of this research is expected to serve as an evidence-based policy tool for designing precise, targeted, and culturally sensitive health promotion interventions to eliminate systemic barriers and progressively increase basic immunization coverage.

METHOD

This study utilized a descriptive quantitative research design (Notoatmodjo, 2018). The selection of this operational design was based on its effectiveness in factually and precisely illustrating, mapping, and describing the characteristics of socio-demographic determinants, maternal health practice modifications, and basic immunization completeness status without intervention. This approach is commonly recommended for mapping maternal and child health profiles. Primary data collection was conducted from April to May 2022 at the Independent Midwifery Practice (IMP) "W" in Palangka Raya City. This location was purposively selected because it represents a primary healthcare facility serving a heterogeneous population, with both sociocultural characteristics and physical accessibility. Such spatial and demographic characteristics are highly relevant for objectively and systematically analyzing disparities in basic immunization coverage.

The target population under observation in this study included all mothers with infants aged 10 to 12 months recorded as visiting IMP "W" between February and September 2021, totaling 94 individuals. To ensure statistically adequate sample representation, the sample size was calculated using the Slovin formula with a 10% margin of error (0.1). This mathematical calculation resulted in a minimum sample size of 48 respondents, to which a 10% quota was added to anticipate data attrition (drop-out) during field observation. This policy yielded a final sample of 53 respondents. The calculation and sampling approach align with quantitative methodological principles that prioritize proportional accuracy to mitigate selection bias in public health research.

The primary data source relied on information extracted directly from the research subjects through structured face-to-face interviews (Sugiyono, 2019). The use of closed-ended questionnaires as a data-collection instrument is a proven, reliable approach for measuring descriptive health practice variables, such as maternal knowledge, affective attitudes, and compliance with vaccination schedules. Specifically, this study employed a questionnaire adapted from a rigorously calibrated standard instrument by Iskandar (2009). Psychometric testing of this reference instrument showed that of 35 items assessing complete basic immunization knowledge, 25 were

found to be statistically valid, with a reliability coefficient (Cronbach's Alpha) of 0.86. This high level of reliability is essential to ensure that the instrument is free from measurement distortion when applied to a population with diverse sociocultural backgrounds.

During data collection, this study adhered to the ethical principles of medical and public health research. The research protocol was formally evaluated and approved by the Health Research Ethics Committee of *Poltekkes Kemenkes Palangkaraya* with Ethical Clearance Registration Number 168/V/KE.PE/2022. In accordance with standard research operating procedures, each potential respondent was provided with an Explanation Sheet for Informed Consent (PSP) and was required to sign an Informed Consent form as a manifestation of voluntary participation without coercion. In addition to the commitment to protecting respondents' identities and demographic records, all field interactions were supervised through the implementation of preventive health protocols (mask-wearing, hand disinfection, and temperature checks) to reduce the risk of disease transmission during observation at the healthcare facility.

To transform raw data into meaningful scientific information, data analysis techniques were designed using a descriptive quantitative statistical approach (Dahlan, 2020). All questionnaire data were edited, coded, and tabulated before analysis using statistical software. Consistent with the research design objectives, the analysis focused on univariate analysis to describe the frequency distribution and proportions (percentages) of each variable independently, covering both independent determinants and the dependent variable (basic immunization completeness status). This descriptive tabulation method was selected for its precision in mapping central tendencies and providing a comprehensive overview of immunization schedule fulfillment probabilities. This descriptive univariate approach has also been validated for its reliability in drawing objective conclusions from public health phenomena.

RESULTS

Based on research conducted at the IMP "W" in Palangka Raya City, involving 53 respondents, data on the overview of complete basic immunization were obtained. The data were categorized into maternal characteristics and health practice variables, which were then analyzed using cross-tabulation to objectively assess immunization completeness across groups. The study's systematic results are presented below.

Table 1. Frequency Distribution of Complete Basic Immunization Based on Maternal Characteristics

Maternal Characteristics	Immunization				Total	
	Complete		Incomplete		n	%
	n	%	n	%		
Age						
< 20 years	0	0.00	2	100.00	2	100.00
20 – 35 years	31	64.58	17	35.42	48	100.00
> 35 years	2	66.67	1	33.33	3	100.00
Education						
Primary	0	0.00	6	100.00	6	100.00
Secondary	20	58.82	14	41.18	34	100.00
Tertiary	13	100.00	0	0.00	13	100.00
Employment Status						
Employed	12	92.31	1	7.69	13	100.00
Unemployed	21	52.50	19	47.50	40	100.00
Income Level						
< Regional Min. Wage	9	31.03	20	68.97	29	100.00
≥ Regional Min. Wage	24	100.00	0	0.00	24	100.00
Ethnicity						
Dayak	15	83.33	3	16.67	18	100.00
Banjar	11	42.31	15	57.69	26	100.00
Jawa	7	77.78	2	22.22	9	100.00
Distance to Facility						
< 1 KM	14	73.68	5	26.32	19	100.00
> 2 KM	19	55.88	15	44.12	34	100.00

Source: Primary Data, 2022.

Based on the data in Table 1, maternal age provides an essential overview: mothers in their productive years (20 – 35 years) have a complete immunization rate of 64.58%. All mothers aged under 20 years (100.00%) had not completed their infants' basic immunization. Regarding education, mothers with tertiary education showed full compliance (100.00%), while all mothers with primary education were recorded as failing to provide complete immunization. Employment and economic factors also showed consistent results: mothers who were employed (92.31%) and those with incomes at ≥ the Regional Minimum Wage (100.00%) were more likely to comply with immunization schedules. Furthermore, ethnic background revealed disparities, with Dayak mothers recording the highest completeness rate (83.33%). Residential distance also served as a supporting factor: mothers living closer to the health facility (< 1 km) had a higher completion rate (73.68%) than those living farther away (55.88%).

Table 2. Frequency Distribution of Complete Basic Immunization Based on Research Variables

Research Variable	Immunization				Total	
	Complete		Incomplete			
	n	%	n	%	n	%
Knowledge						
Good	17	100.00	0	0.00	17	100.00
Moderate	0	0.00	14	100.00	14	100.00
Poor	16	72.73	6	27.27	22	100.00
Attitude						
Good	23	100.00	0	0.00	23	100.00
Poor	10	35.71	18	64.29	28	100.00
Moderate	0	0.00	2	100.00	2	100.00
Practice						
Good	33	100.00	0	0.00	33	100.00
Poor	0	0.00	20	100.00	20	100.00

Source: Primary Data, 2022.

Table 2 describes the profile of immunization completeness based on maternal knowledge, attitude, and practice factors. Regarding the knowledge variable, all mothers with “Good” knowledge were fully immunized (100.00%). However, analysis revealed that in the “Poor” knowledge group, the immunization completeness percentage was notably high at 72.73%. Conversely, in the “Moderate” knowledge group, all respondents (100.00%) failed to complete their infants’ immunization status. For the attitude factor, mothers in the “Good” attitude category demonstrated absolute compliance (100.00%). Finally, the practice variable presented a stark contrast: all mothers with “Good” practice (100.00%) completed basic immunization, whereas all mothers with “Poor” practice (100.00%) did not complete their infants’ immunization.

DISCUSSION

This study was conducted to identify the determinants of basic immunization completeness among infants at IMP “W” in Palangka Raya City. The collected data revealed that 62.26% of infants received complete immunizations; however, 37.74% remained incomplete. This nearly 40% incompleteness rate serves as a warning indicator for achieving UCI targets at the primary care level. This condition aligns with global concerns highlighted by [Tesema et al. \(2020\)](#), stating that millions of children worldwide remain at risk of death from Vaccine-Preventable Diseases (VPDs) if protection coverage does not reach safe thresholds. These findings confirm that

basic immunization is a preventive health service whose success depends heavily on parental social conditions and practices (Arianggara et al., 2023).

When analyzed by age, mothers in their healthy reproductive period (20 – 35 years) demonstrated a relatively high compliance rate of 64.58%. In contrast, all mothers < 20 years of age (100.00%) failed to complete their infants' immunizations. This suggests that younger age is often associated with a lack of mental maturity and experience in managing child health (Sartika & Fauziah, 2024). This analysis reinforces the argument by Henuck et al. (2024) that maternal age is a crucial factor in health decision-making, where more mature mothers typically possess higher awareness and emotional stability to protect their infants through immunization. The adolescent maternal group requires specific attention because their psychological barriers can directly impact the continuity of their children's immunization status.

Education level also presented a stark contrast in this study. Mothers with tertiary education recorded a 100.00% complete immunization rate, while all mothers with primary education (100.00%) failed to complete their infants' immunizations. These data provide empirical evidence that higher maternal education is associated with greater acceptance of health programs (Ismail et al., 2023). Interestingly, this finding differs from the empirical results of Riza et al. (2018) and Suliawati et al. (2023), which found that education does not always guarantee complete immunization. However, in the Palangka Raya region, formal education proved effective at filtering health information, leading better-educated mothers to be significantly more compliant with vaccination schedules.

Employment and family economic factors also emerged as powerful determinants. Employed mothers had a completeness rate of 92.31%, significantly higher than that of unemployed mothers (52.50%). Furthermore, families with incomes above the Regional Minimum Wage showed absolute compliance (100.00%). This illustrates that sufficient income and an informative work environment have a positive impact on health practices. These findings are supported by Monica et al. (2024), who state that economic independence facilitates maternal access to transportation and healthcare services. Additionally, Saragi et al. (2024) mentioned that family financial stability is a vital enabling factor for ensuring the continuous completion of basic immunization programs.

From a cultural perspective, Dayak mothers had the highest complete immunization rate (83.33%) compared to Javanese (77.78%) and Banjar (42.31%). The high rate among the Dayak ethnicity in this location indicates that the local community has adapted well to government health programs or possesses strong community support. These data provide a new perspective that differs from that of Hafid et al. (2024), who suggested that culture rarely influences immunization status.

Conversely, these findings support the view of [Masyudi et al. \(2023\)](#) that cultural norms and ethnic beliefs can be strong drivers of mothers' completion of their children's immunizations. The disparities between ethnic groups emphasize the importance of culturally sensitive health promotion.

Physical distance to health facilities also presented a significant barrier. Mothers living nearby (< 1 KM) had a completeness rate of 73.68%, while those living farther away (> 2 KM) had a rate of 55.88%. These data prove that travel distance remains an obstacle for mothers bringing their infants to midwives. This condition aligns with the study by [Hardhantyo and Chuang \(2021\)](#), which found disparities in immunization coverage due to geographic barriers in Indonesia. Long distances increase travel costs and time, ultimately hindering maternal visits to community health centers or midwives ([Arpen & Afnas, 2023](#)). Therefore, bringing services closer to the community remains a critical strategy.

This study found specific results regarding the knowledge variable. Mothers with "Good" knowledge demonstrated 100.00% compliance; however, those with "Poor" knowledge unexpectedly had a relatively high completion rate of 72.73%. This was significantly better than the "Moderate" knowledge group, which recorded a 0.00% completion rate. This data characteristic suggests that mothers with low understanding can still be compliant due to other factors, such as following midwives' instructions or environmental influences. This slightly differs from the theory of [Syukri and Appi \(2021\)](#), which posits that knowledge is directly proportional to immunization completeness. However, the finding aligns with observations by [Riza et al. \(2018\)](#) that social pressure or environmental encouragement can lead the community to adhere to schedules despite suboptimal technical understanding.

Regarding the attitude factor, mothers with a "Good" attitude recorded absolute immunization completeness (100.00%). In contrast, those with a "Poor" attitude reached only 35.71%, and those with a "Moderate" attitude did not complete immunizations (0.00%). These data indicate that maternal perspective toward vaccination is a primary requirement for program success. This result confirms the research by [Safitri and Andika \(2020\)](#), which found that a positive attitude reflects maternal readiness to face potential side effects for their children's long-term health. The low rate among mothers with poor attitudes signals persisting fears or misinformation regarding vaccine safety that must be addressed immediately.

The practice variable, or actual maternal actions, provided the most definitive results in this study. All mothers with "Good" practices (100.00%) received complete basic immunizations, while all mothers with "Poor" practices (100.00%) did not. This stark difference proves that practice is the objective evidence of all contributing factors. This consistency is supported by [Rahmatina and Erawati \(2021\)](#), stating that

parental compliance is the primary key to maintaining child health. This underscores that the ultimate goal of health education is to transform maternal intention into action, ensuring that every infant is fully protected.

When all these factors are integrated, immunization completeness at IMP “W” is heavily influenced by the interplay between education, economy, distance, knowledge, and maternal attitude. Although family support was not specifically measured in the research tables, the mothers’ poor knowledge of compliance indicates strong external influences. This aligns with the view of [Marniati et al. \(2022\)](#) that, while social support might not be felt directly by independent mothers, in diverse socio-demographic contexts, it remains a primary source of support. The combination of individual maternal conditions and ease of service access serves as the main reason for the level of infant protection at the study site.

Overall, this study’s results show that infant immunization completeness in Palangka Raya is largely determined by maternal education level, family economic capability, distance to health facilities, and understanding and attitudes toward the immunization program. The differing probabilities in the “Good” and “Moderate” knowledge groups provide an important lesson that health education must be designed to be more precisely targeted. Health information must be able to transform individual practices into more positive, tangible actions ([Wei & Arisani, 2024](#)). These findings are expected to serve as a technical guide for midwives and other health professionals in designing more effective socialization strategies, ensuring that every child can receive their health rights through complete immunization.

CONCLUSION AND SUGGESTIONS

The results of the study involving 53 mothers at IMP “W” Palangka Raya City indicate that infant basic immunization completeness is significantly influenced by maternal socio-demographic backgrounds and health practices. Overall, 62.26% (33 infants) received complete immunizations, while the remaining 37.74% (20 infants) did not. These findings address the primary research problem regarding the low Universal Child Immunization (UCI) coverage in the region. The alignment between the objective of mapping determinants and the observed results indicates that personal characteristics and tangible maternal actions are the primary variables that ensure infants receive comprehensive physiological protection.

In terms of socio-demographic background, this study concludes that economic factors and formal education are the most potent drivers of mothers completing their children’s immunizations. Mothers with tertiary education, employed status, and family incomes above the Regional Minimum Wage all recorded absolute immunization completeness rates of 100.00%. Conversely, significant barriers were observed in

the adolescent maternal group (aged under 20 years) and in mothers with primary education, among whom 100.00% had not completed their infants' immunizations. Residential distance also had a measurable impact: mothers living within 1 KM of the healthcare facility had higher completion rates (73.68%) than those residing more than 2 KM away (55.88%). Furthermore, ethnicity revealed disparities, with the highest level of completeness achieved among the Dayak ethnic group (83.33%).

In the domain of health practices, the results definitively show that maternal attitudes and actions dictate a child's immunization status. All mothers with "Good" practices and attitudes successfully achieved 100.00% immunization completeness for their infants. A unique finding emerged regarding the knowledge factor; while mothers with "Good" knowledge showed full compliance (100.00%), those with "Poor" knowledge also recorded a high completion rate of 72.73%. This figure demonstrates that maternal adherence to healthcare provider instructions can compensate for a lack of technical understanding regarding immunization. Comprehensively, the integration of accurate understanding, positive perspectives, and tangible actions represents the answer to this study's objective in measuring health practice determinants.

As follow-up recommendations, Independent Midwifery Practices (IMP) are advised to provide educational materials that are simple and sensitive to maternal cultural characteristics and education levels. Given that mothers with limited knowledge still have the potential to comply, healthcare providers need to maintain friendly, personalized communication to sustain maternal motivation. Regarding policy, it is recommended to initiate active home-visit services or expand the Integrated Healthcare Center (*Posyandu*) network for residents living more than 2 KM from health facilities. This step is necessary to eliminate spatial accessibility barriers. Furthermore, special attention and dedicated guidance are mandatory for vulnerable target groups, specifically adolescent mothers and those with primary-level education.

Academically, this study provides an empirical foundation for the development of public health science in Central Kalimantan. Future researchers are encouraged to analyze supporting determinants not measured in this study, such as the role and support of community leaders, particularly in ethnic groups with low immunization completeness rates. Additionally, the distribution of knowledge in this study can serve as a preliminary basis for qualitative research to explore sociological reasons why mothers with limited understanding still adhere to basic immunization schedules. In-depth research in this area will be highly beneficial in designing future preventive health service strategies.

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