SEHATRAKYAT (Jurnal Kesehatan Masyarakat)
https://journal.yp3a.org/index.php/sehatrakyat
DOI: 10.54259/sehatrakyat.v4i4.5992
e-ISSN 0852-1239 | p-ISSN 2829-9299
Vol. 4 No. 4 (November 2025) 1224-1235

Diterima Redaksi: 07-09-2025 | Selesai Revisi: 02-10-2025 | Diterbitkan Online: 15-11-2025

Effectiveness Evaluation of Single-Session Socialization on HIV/AIDS Knowledge among Rural Adolescents in East Kalimantan

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Abstract

Indonesia reports approximately 540,000 HIV cases according to UNAIDS data, with rural adolescents experiencing significant knowledge gaps regarding HIV/AIDS transmission and prevention. Educational interventions are crucial for addressing these deficits, particularly in remote areas with limited healthcare information access. This research to evaluate the effectiveness of socialization interventions on HIV/AIDS knowledge among rural adolescents in East Kalimantan, Indonesia. A quasi-experimental pre-post study design was conducted among 47 adolescents aged 10-17 years in Loa Ulung Village, East Kalimantan. The intervention utilized leaflets and interactive two-way discussions covering HIV/AIDS transmission modes and prevention strategies. Data collection employed a validated 10-item questionnaire administered pre- and post-intervention. Statistical analysis included Shapiro-Wilk normality testing and Wilcoxon signed-rank test for non-parametric comparisons. Pre-intervention knowledge scores averaged 7.43 (SD=1.500), increasing to 7.81 (SD=1.715) post-intervention. The Wilcoxon signed-rank test showed no statistically significant difference (p=0.128), with a normalized gain score of 0.14 indicating low effectiveness. Persistent misconceptions included: 63.8% incorrectly believing all HIV-infected individuals develop AIDS, 23.4% thinking HIV transmits through sharing utensils, and 17.0% believing shared toilets cause transmission. Single-session educational interventions demonstrated limited effectiveness in improving HIV/AIDS knowledge among rural adolescents. Future programs should incorporate age-appropriate, interactive methodologies with extended duration and follow-up sessions for optimal outcomes in rural Indonesian settings.

Keywords: *East Kalimantan, HIV/AIDS Education, Prevention Knowledge, Rural Adolescents, Socialization.*

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PENDAHULUAN

Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) continue to pose significant global health challenges, with particular implications for adolescent populations in developing countries(Jocelyn et al., 2024). According to the latest UNAIDS data, there are an estimated 570,000 people living with HIV in Indonesia, representing one of Asia's fastest growing epidemics and underscoring the critical need for effective prevention strategies tailored to vulnerable populations(Kementerian Kesehatan RI, 2024). Recent epidemiological data indicates that Indonesia has experienced approximately 27,000 new HIV infections annually among individuals aged over 15 years, with projections showing concerning trends particularly in rural areas(UNAIDS, 2024).

The burden of HIV/AIDS disproportionately affects adolescents, particularly those residing in rural areas where access to comprehensive health information and services remains limited(Murti et al., 2024). Research has demonstrated that only 15% of Indonesian adolescents possess adequate HIV/AIDS knowledge, with significantly lower rates observed in rural areas (5.5%) compared to urban settings (9.5%)(Arifin et al., 2023). This represents a threefold knowledge gap between rural and urban populations, highlighting the urgent need for targeted interventions. This knowledge deficit represents a fundamental barrier to effective HIV prevention, as understanding transmission modes and prevention strategies forms the foundation of risk-reduction behaviors among young people(DuRant et al., 1992).

Educational interventions have emerged as cornerstone strategies in HIV prevention programs worldwide(Krishnaratne et al., 2016). Systematic reviews of educational-based HIV/AIDS prevention interventions have indicated success in improving knowledge and attitudes among youth, though translation to actual risk-reduction behavioral changes has shown mixed results(Fonner et al., 2014). Studies from Sub-Saharan Africa have highlighted the importance of addressing HIV-related knowledge deficits through targeted interventions, particularly given persistent stigmatization and relatively low knowledge of transmission and prevention measures(Faust & Yaya, 2018).

The effectiveness of school-based HIV prevention programs has been documented across various populations(Gao et al., 2012). School-based HIV/AIDS health education has demonstrated effectiveness as a prevention strategy among adolescents, with studies involving students aged 11-18 years showing measurable improvements in knowledge and attitudes(Abdu et al., 2016). Indonesian research has specifically explored school-based HIV prevention curricula targeting junior high school students, focusing on increasing knowledge and developing life-skills to prevent HIV infection through drug use and risky sexual behavior(Pohan et al., 2011).

However, the rural Indonesian context presents unique challenges that may influence intervention effectiveness(Wijayanti et al., 2016). Rural adolescents often face additional barriers including geographic isolation, limited healthcare infrastructure, cultural factors, and reduced access to educational resources(Kurniadi et al., 2025). Despite multiple years of government HIV educational efforts in Indonesia, the growing trend of new cases runs parallel with seemingly overall lack of comprehensive knowledge about HIV, particularly among vulnerable populations in remote areas(Jocelyn et al., 2024). Cultural barriers specific to East Kalimantan, including traditional beliefs about health and disease, parental restrictions on sexuality education, and stigma associated with HIV/AIDS discussions, further complicate prevention efforts in this region(Chowdhury & Yamauchi, 2010). Cultural barriers specific to East Kalimantan, including traditional beliefs about health and disease, parental restrictions

on sexuality education, and stigma associated with HIV/AIDS discussions, further complicate prevention efforts in this region. In Loa Ulung Village specifically, deeply rooted norms emphasizing modesty and avoidance of open conversations about sexuality—particularly between adolescents and adults—limit adolescents' ability to access accurate reproductive health information. Community elders often perceive sexuality education as inappropriate for unmarried youth, and parents commonly discourage participation in discussions related to sexual behavior due to concerns that such information may "encourage" premarital activity. These culturally embedded expectations contribute to reluctance among adolescents to ask questions, reduce engagement during health education activities, and ultimately restrict the acceptance of HIV/AIDS prevention messages.

The duration and methodology of educational interventions appear to be critical determinants of success(Chan et al., 2021). Research comparing different clinic-based AIDS education programs found that interventions demonstrating improved outcomes in condom use and reduced number of sexual partners were longer in duration than those that did not achieve these improvements. Studies have suggested that interventions increasing AIDS knowledge and changing attitudes toward risky sexual behavior may have beneficial effects on adolescents' HIV infection risk(Chan et al., 2021). Intervention with discussion and leaflet method can to reflect the local program context, it is important to note that the lecture-based educational session supported by leaflet distribution represents the standard HIV/AIDS prevention method routinely implemented by government health programs and Primary Health Centers (Puskesmas) in this rural region. The continued reliance on this approach is largely due to limited human resources, budget constraints, and the absence of technology-assisted educational tools. These constraints are even more pronounced in Loa Ulung, which is the most remote and outermost village in the Tenggarong Seberang subdistrict of Kutai Kartanegara Regency, making access to alternative health education modalities particularly challenging. Therefore, evaluating the outcomes of this traditional intervention is essential, as the present study serves as an audit of the effectiveness of the existing standard program currently relied upon in the area.

Knowledge gaps persist even after educational interventions, with specific misconceptions requiring targeted attention. Common misconceptions include beliefs about HIV transmission through casual contact, sharing of utensils, or environmental exposure(Arifin et al., 2023). Research among university students has demonstrated that HIV/AIDS awareness improves significantly after receiving educational interventions, underscoring the utility of such approaches in HIV/AIDS control and prevention efforts(Liu et al., 2020).

Recent Indonesian studies have reinforced these findings. Kurniadi et al. (2025) demonstrated significant associations between education level, HIV test awareness, and comprehensive knowledge among women in rural Southwest Sumba(Kurniadi et al., 2025), while other studies have highlighted persistent knowledge gaps among female youth, with 62.15% having no HIV-related knowledge and regional disparities across Indonesian islands(Wardani, 2023).

The Indonesian government and civil society have implemented numerous initiatives to address the HIV/AIDS epidemic(Wijayanti et al., 2016). The Global Fund investment is focused in 178 HIV priority districts with an allocation of $102 million for three years (2024-2026), while the US government made an annual investment of $11 million for the HIV response in Indonesia in 2024-25. From a historical perspective, Indonesia now possesses the means to rapidly diagnose HIV cases, yet prevention efforts remain crucial, particularly among adolescent populations(Qun Zhao,

Xiaoming Li, Bonita Stanton, Rong Mao, Jing Wang, Lingran Zhong, 2017). The development of evidence-based educational interventions specifically designed for rural Indonesian adolescents represents a critical need in the national HIV prevention strategy(Pohan et al., 2011).

East Kalimantan, as one of Indonesia's resource-rich provinces, presents a unique context for HIV prevention research(Wijayanti et al., 2016). The province's demographic characteristics, including rural communities with limited healthcare access, make it an important setting for evaluating the effectiveness of community-based educational interventions(Kurniadi et al., 2025). Understanding the specific knowledge gaps and intervention responses among rural adolescents in this region can inform broader prevention strategies across similar Indonesian contexts(Arifin et al., 2023).

This research addresses a critical gap in understanding how socialization interventions can improve HIV/AIDS prevention knowledge among rural Indonesian adolescents(Pohan et al., 2011). By evaluating the effectiveness of structured educational interventions using interactive methodologies, this study contributes to the evidence base for developing culturally appropriate and contextually relevant HIV prevention programs. The findings have implications for public health policy, educational program design, and resource allocation for HIV prevention efforts in rural Indonesian communities(Wijayanti et al., 2016).

The objective of this study was to evaluate the effectiveness of a socialization intervention on HIV/AIDS prevention knowledge among rural adolescents in East Kalimantan, Indonesia, using a quasi-experimental pre-post design to assess knowledge changes and identify persistent misconceptions requiring targeted intervention strategies.

METHOD

This study employed a quasi-experimental pre-post design to evaluate the effectiveness of a socialization intervention on HIV/AIDS prevention knowledge among rural adolescents in East Kalimantan, Indonesia. The study was conducted without a control group, using participants as their own controls through pre-intervention and post-intervention measurements. The quasi-experimental design is a research methodology that lies between the rigor of a true experimental method (true experimental design includes random assignment to at least one control and one experimental/interventional group) and the flexibility of observational studies. This method is often used in social sciences, education, and public health research. Quasi-experimental designs include the posttest-only design with a control group, one-group pretest-posttest design, and pretest-posttest with a control group(Capili & Anastasi, 2025)

The research was conducted in July 2025 in Loa Ulung Village, Tenggarong Seberang Sub-district, Kutai Kartanegara Regency, East Kalimantan Province, Indonesia. This rural setting was selected due to its limited access to healthcare information and services, representing typical challenges faced by remote Indonesian communities.

The study population consisted of adolescents residing in Loa Ulung Village, with a total of 47 adolescents aged 10-17 years voluntarily participating in the HIV/AIDS education session. Participants were recruited through community announcements and represented a convenience sample of adolescents willing to attend the Sunday education session.

Based on previous educational intervention studies in similar populations, we assumed a medium effect size (Cohen's d = 0.5) for knowledge improvement, with alpha level of 0.05 and power of 0.80. The calculated minimum sample size was 34 participants. Our sample of 47 participants exceeded this requirement, providing adequate power to detect meaningful differences.

Inclusion criteria for the study encompassed: (1) adolescents aged 10-17 years who were residents of Loa Ulung Village, (2) provided voluntary participation and attendance at the education session, and (3) demonstrated ability to complete questionnaires independently. Exclusion criteria included: (1) individuals outside the specified age range, (2) non-residents of the study area, and (3) inability to participate in the full session including pre-test, intervention, and post-test components.

The socialization intervention consisted of a single-session educational program utilizing custom-designed leaflets containing comprehensive information about HIV/AIDS transmission modes and prevention strategies. The leaflets were developed based on WHO and Indonesian Ministry of Health guidelines for adolescent HIV education.

The delivery method employed an interactive two-way discussion format with question-and-answer sessions facilitated by lecture from Faculty of Medicine Universitas Mulawarman. The content coverage included: (1) HIV/AIDS basic knowledge and definitions, (2) transmission modes and common misconceptions, (3) prevention strategies and protective behaviors, and (4) risk factors identification.

Data collection employed 10-item questionnaire specifically developed for assessing HIV/AIDS knowledge among adolescents. The questionnaire was designed to comprehensively evaluate participants' understanding based on the educational materials used in the intervention. The 10-item questionnaire assessed knowledge across key domains including: (1) HIV definition and basic pathophysiology, (2) transmission modes both correct and incorrect, (3) relationship between HIV and AIDS, (4) prevention strategies, and (5) common misconceptions about transmission.

The questionnaire was administered as a pre-test for 10 minutes prior to the educational intervention and as a post-test for 10 minutes immediately following the intervention. The data collection procedure involved three phases: Pre-intervention phase: Participants completed the 10-item knowledge questionnaire with scoring whereby each correct answer received 1 point for a maximum score of 10 points; Intervention phase: Educational session using leaflets and interactive two-way discussion with question-and-answer format lasting approximately 60 minutes with 20 minutes allocated for material delivery and 40 minutes for discussion and a question-and-answer session.; and Post-intervention phase: Immediate post-test administration using the same questionnaire to assess knowledge retention.

Statistical analysis was conducted using SPSS version 21.0 with several procedures. Missing Data Handling: No missing data were encountered as all participants completed both pre- and post-tests during the supervised session.

The Shapiro-Wilk test was applied to assess data normality, with the significance level set at $\alpha = 0.05$. Based on normality test results, comparative analysis employed Wilcoxon signed-rank test for non-normal distribution, as parametric assumptions were not met.

Effect size calculation utilized the normalized gain score formula: N-gain = (Post-test score - Pre-test score) / (Maximum score - Pre-test score). Interpretation of N-gain followed established criteria where N-gain ≥ 0.7 indicated high effectiveness, 0.3-0.7 indicated moderate effectiveness, and < 0.3 indicated low effectiveness. Individual question analysis was conducted to identify: (1) questions with highest error rates, (2)

persistent misconceptions post-intervention, and (3) areas requiring targeted educational focus.

RESULTS

Study Population Characteristics

A total of 47 rural adolescents in age from 10-17 years, with heterogeneous age distribution contributing to varied baseline knowledge levels.

Table 1. Descriptive Statistics of Pre- and Post-Intervention Knowledge Scores

Assessment Phase	n	Mean	SD	Minimum	Maximum
Pre-Intervention	47	7.43	1.500	3	10
Post-Intervention	47	7.81	1.715	3	10

Table 1 presents the descriptive statistics for pre- and post-intervention knowledge assessment scores among rural adolescents participating in the HIV/AIDS socialization intervention.

Table 2. Normality Test Results Using Shapiro-Wilk Test

Variable	Statistic	df	Sig.	Category
Pre-test Score	0.909	47	0.001	Non-Normal
Post-test Score	0.905	47	0.001	Non-Normal

Table 2 displays the results of normality testing using the Shapiro-Wilk test, appropriate for sample sizes below 50 participants. Both datasets demonstrated non-normal distribution ($p < 0.05$), warranting the use of non-parametric statistical testing.

Table 3. Wilcoxon Signed-Rank Test Results

Test Statistics	Value
Z-Score	-1.524
Asymptotic Significance (2-tailed)	0.128
Effect Size (r)	0.157
Conclusion	No Significant difference

Table 3 summarizes the Wilcoxon signed-rank test results comparing pre- and post-intervention knowledge scores. The analysis revealed no statistically significant difference between pre- and post-intervention knowledge scores ($p = 0.128 > 0.05$), indicating limited intervention effectiveness. The rank-biserial correlation of 0.157 represents a small effect size.

Table 4. Normalized Gain Score Analysis

Parameter	Value	Interpretation
Pre-test Mean	7.43	-
Post-test Mean	7.81	-
Score Improvement	0.38	-
Maximum Possible Score	10	-
N-Gain Score	0.14	Low Effectiveness

The normalized gain score of 0.14 indicates low intervention effectiveness according to established educational assessment criteria (N-gain < 0.3 = low effectiveness).

Table 5. Individual Question Analysis and Misconception Categories

Question	Topic	Pre-test Error Rate (%)	Post-test Error Rate (%)	Misconception Category
1	HIV Definition	10.6	2.1	Low-Level
2	HIV Testing	8.5	6.4	Low-Level
3	HIV-AIDS Relationship	68.1	63.8	Critical
4	Sexual Transmission	17.0	14.9	Moderate
5	Blood Transmission	25.5	17.0	Critical
6	Mother-to-Child	19.1	14.9	Moderate
7	Utensil Sharing	27.7	23.4	Critical
8	Casual Contact	17.0	14.9	Moderate
9	Toilet Sharing	21.3	17.0	Critical
10	Prevention Methods	12.8	8.5	Low-Level

Table 5 presents the highlighting persistent misconceptions after the intervention.

Intervention Implementation Challenges

Several factors potentially contributed to limited intervention effectiveness are age heterogeneity: Wide age range (10-17 years) with uneven frequency distribution; intervention duration: Single-session format may have been insufficient for comprehensive knowledge acquisition and retention; methodology limitations: Exclusive reliance on leaflet-based two-way discussion methodology may not have adequately addressed diverse learning preferences among adolescent participants

Knowledge Retention Patterns

The minimal improvement in mean scores (0.38-point increase) combined with persistent high-frequency misconceptions suggests that traditional educational approaches may be inadequate for addressing deeply embedded HIV/AIDS misconceptions in rural adolescent populations. The intervention appeared most effective for basic definitional knowledge (Item 1) while showing limited impact on complex transmission mechanism understanding and HIV-AIDS progression concepts.

DISCUSSION

The findings of this quasi-experimental study revealed limited effectiveness of a single-session socialization intervention in improving HIV/AIDS knowledge among rural adolescents in East Kalimantan, Indonesia. The normalized gain score of 0.14 indicates low intervention effectiveness, consistent with previous evidence showing that brief educational approaches rarely produce meaningful knowledge or behavior changes among adolescents (I et al., 2005; Medley et al., 2009). From a behavioral science perspective, the intervention primarily targeted the cognitive domain (knowledge) without sufficiently addressing key constructs of the Health Belief Model—such as perceived susceptibility, perceived severity, and perceived benefits—which are critical in shaping adolescents' motivation to internalize and retain HIV prevention information (Rosenstock et al., 1988). Similarly, the Theory of Planned Behavior emphasizes that subjective norms and perceived behavioral control influence sexual health behaviors, yet these constructs were not incorporated into the one-way lecture and leaflet format (Ajzen, 1991). This theoretical gap may help explain why misconceptions remained largely uncorrected.

A deeper examination of the data shows that persistent misconceptions—particularly the belief that all individuals living with HIV will inevitably progress to AIDS (63.8% incorrect)—reflect entrenched misunderstandings that require more

intensive and repeated educational engagement. Misconceptions regarding HIV transmission through sharing eating utensils (23.4%) and toilet facilities (17.0%) also remained high. Similar misconceptions have been documented in rural Indonesian and Southeast Asian contexts, where limited sex education, cultural taboos, and low health literacy contribute to misinformation (Zhao et al., 2017; Kareem et al., 2023). These misconceptions pose serious public health risks; when adolescents perceive HIV as being transmitted through casual contact, stigma and social avoidance toward people living with HIV (PLHIV) remain high (Herek, 1999).

The wide age range of participants (10–17 years) may have reduced the intervention's effectiveness, as cognitive maturity, abstract reasoning, and risk perception differ significantly between early and late adolescence. Evidence suggests that HIV education is more effective when developmentally tailored, as early adolescents benefit more from concrete and structured content, while older adolescents respond better to interactive, context-based learning (I et al., 2005). The one-size-fits-all design of this intervention may therefore have diluted instructional impact.

Another limitation is the single-session intervention format. Multi-session and curriculum-integrated programs consistently demonstrate stronger and more sustained effects on HIV knowledge and behavior change (Abramsky et al., 2012; UNESCO, 2018). One-off socialization events—commonly used by government health agencies and local Puskesmas due to limited resources—are known to produce short-term gains but are generally ineffective in correcting deep-rooted misconceptions (UNICEF, 2019). Leaflets may increase basic knowledge but often fail to influence deeper behavioral determinants such as perceived susceptibility and normative beliefs (Rosenstock et al., 1988). This mismatch between intervention content and behavioral mechanisms likely contributed to the limited improvement observed.

Comparative evidence strongly supports peer-led and participatory models. Peer educator interventions have shown superior effectiveness in Nigeria, Yemen, and rural China by enhancing relatability, reducing communication barriers, and influencing subjective norms more effectively than adult-led lectures (Habib et al., 2024; Al-Iryani et al., 2011; Wang et al., 2013). The absence of peer educator involvement in this study may therefore explain the low retention and minimal change in misconceptions.

The rural context of Loa Ulung Village further compounds these challenges. As one of the most remote villages in the Tenggarong Seberang subdistrict, Loa Ulung experiences limited access to health information, low digital connectivity, and cultural norms that discourage open conversations about sexuality. These factors align with evidence showing that adolescents in remote Indonesian settings face structural and cultural barriers to accurate HIV knowledge acquisition (Kareem et al., 2023). Cultural expectations emphasizing modesty and parental restrictions toward discussions of sexuality reduce adolescents' willingness to ask questions, hindering the effectiveness of conventional educational formats.

Taken together, these findings highlight the need for policy reform. Given the absence of significant knowledge improvement, this study provides empirical grounds for critiquing current government practices. The "once-off" socialization model widely implemented by local health authorities is unlikely to produce meaningful change and may represent an inefficient use of limited public health resources (UNICEF, 2019). Evidence supports a shift toward multi-session, curriculum-based HIV education integrated into school programs, complemented by peer educators and culturally adapted, interactive learning strategies (UNESCO, 2018). These approaches are more likely to address behavioral determinants, reduce HIV-related stigma, and enhance long-term knowledge retention.

Limitations

Several limitations must be acknowledged in interpreting these findings. The quasi-experimental design without a control group limits causal inference about intervention effects. The convenience sampling method may have introduced selection bias, as participants were self-selected volunteers who may have differed systematically from the broader adolescent population. The immediate post-test assessment does not provide information about knowledge retention over time, which is crucial for evaluating educational intervention effectiveness(Farre et al., 2018)

The single-site design in one rural village limits generalizability to other rural Indonesian contexts or different cultural settings. Additionally, the heterogeneous age distribution and lack of stratified analysis by demographic variables may have obscured differential intervention effects across participant subgroups. The reliance on self-report measures may have introduced social desirability bias, particularly for sensitive health topics among adolescent populations (Yusuf Olushola Kareem, Cyprian Issahaku Dorgbetor & Zubaida Abubakar, Babatunde Adelekan, Erika Goldson, 2023).

Implications for Practice and Policy

These findings have important implications for HIV prevention program development in rural Indonesian settings. The results suggest that single-session educational interventions, while potentially useful for basic knowledge dissemination, are insufficient for achieving comprehensive knowledge improvements and misconception correction among rural adolescents.

Future HIV prevention programs should incorporate: extended duration interventions with multiple sessions spanning several weeks; peer educator training and implementation strategies; age-stratified content delivery approaches; systematic misconception identification and targeted correction strategies; and follow-up sessions to reinforce key concepts and assess knowledge retention(Harrison et al., 2010).

Policy recommendations include integrating peer-led HIV prevention education into existing school curricula with standardized, age-appropriate content; developing community-based peer education programs that complement school-based initiatives; training adolescent peer educators in effective HIV prevention education delivery; and establishing longitudinal evaluation frameworks for ongoing program improvement and effectiveness assessment(Kefale et al., 2020)..

CONCLUSION

Single-session socialization interventions demonstrated limited effectiveness in improving HIV/AIDS prevention knowledge among rural adolescents in East Kalimantan, Indonesia. The normalized gain score of 0.14 and non-significant statistical results ($p=0.128$) indicate that traditional educational approaches are insufficient for addressing deeply embedded misconceptions in rural populations. Critical knowledge gaps persist, particularly regarding HIV-AIDS progression (63.8% error rate) and transmission routes through casual contact.

These findings contribute to evidence-based HIV prevention strategy development for rural Indonesian contexts and support policy recommendations for sustained, culturally adapted educational interventions targeting adolescent populations at highest risk for HIV acquisition.

Future research should explore multi-session, longitudinal interventions, integrate digital or peer-led educational models, and assess contextual factors—such as stigma, cultural beliefs, and access to health information—that may influence intervention effectiveness in rural settings.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude to the Faculty of Medicine, Universitas Mulawarman, for granting permission and providing financial support for the implementation of this Tri Dharma activity. We also extend our appreciation to the Loa Ulung Village community for their willingness to collaborate as partners in this initiative.

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