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Effect of a community-based sexual violence against children prevention toolkit on caregivers' knowledge, attitudes, and practices in Zanzibar, Tanzania: Findings from the KUWAZA III toolkit evaluation

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Abstract

Background: Sexual violence against children (SVAC) remains a major public health and child protection concern in sub-Saharan Africa. Caregivers play an important role in prevention, yet evidence on caregiver-focused interventions remains limited. This study assessed the effect of the KUWAZA III community-based SVAC prevention toolkit on caregivers' knowledge, attitudes, self-efficacy, and protective communication practices in Zanzibar, Tanzania.

Methods: A non-randomized, quasi-experimental design assessed caregivers in intervention and comparison shehias at baseline and endline. The analysis included 421 caregivers: 218 intervention caregivers who attended at least one KUWAZA III session and 203 comparison caregivers. Outcomes included SVAC knowledge, attitudes and beliefs, caregiver-child communication, and self-efficacy. Difference-in-differences (DiD) models estimated adjusted intervention effects, while augmented inverse probability weighting (AIPW) estimated the average treatment effect on the treated (ATET). Statistical significance was set at $p<0.05$.

Results: The intervention produced targeted improvements in key caregiver outcomes. DiD analysis showed greater odds of rejecting victim-blaming attitudes (AOR 2.96, 95% CI 1.73–5.08; $p<0.001$) and high caregiver self-efficacy (AOR 3.33, 95% CI 1.66–6.82; $p<0.001$) among intervention caregivers compared with comparison caregivers. AIPW analysis showed positive treatment effects for knowledge of SVAC forms (ATET 0.413, 95% CI 0.317–0.510; $p<0.001$), rejection of victim-blaming attitudes (ATET 0.159, 95% CI 0.052–0.265; $p=0.003$), and caregiver-child discussions on SVAC prevention (ATET 0.229, 95% CI 0.116–0.341; $p<0.001$). The AIPW analysis also identified significant negative treatment effects for knowledge of legal protection mechanisms, willingness to

discuss SVAC, positive attitudes toward child discipline, sexuality education communication, and sexual risk-reduction communication.

Conclusions: The KUWAZA III toolkit improved selected caregiver outcomes, particularly rejection of victim-blaming attitudes and caregiver self-efficacy, while AIPW analysis additionally identified positive effects on recognition of SVAC forms and caregiver-child discussions on SVAC prevention. Community-based caregiver interventions may therefore contribute to comprehensive SVAC prevention. Longer-term implementation, refresher sessions, and stronger linkages with child protection and referral systems may be needed to achieve broader and sustained changes.

Keywords: Sexual violence against children; Caregiver interventions; Child protection; Parent-child communication; Zanzibar.

Background

Sexual violence against children (SVAC) is a global public health crisis affecting an estimated 18.9% of females and 14.8% of males before the age of 18, with prevalence largely unchanged since 1990 [1]. Therefore, protecting children and adolescents from all forms of violence remains a fundamental human right and a critical ethical and political imperative [2]. SVAC is defined by the World Health Organization (WHO) as the involvement of a child in sexual activity that they do not fully comprehend, are unable to give informed consent to, or for which they are not developmentally prepared [3]. It encompasses a range of sexual harms, including child sexual abuse (CSA), intra-familial abuse, rape, sexual exploitation, and online sexual abuse among individuals under 18 years [4].

The consequences of SVAC are profound and often extend across the life course [3,5]. Survivors face a high risk of adverse psychosocial, health, and behavioral outcomes, including depression, anxiety, post-traumatic stress disorder, substance abuse, and increased vulnerability to HIV and other sexually transmitted infections [3]. Educational consequences may include poorer academic achievement and school disengagement [2,3]. Economically, the societal impact is staggering, with global costs associated with violence against children estimated at up to USD 7 trillion [5]. Recognizing this gravity, the United Nations' 2030 Agenda for Sustainable Development includes specific targets, such as Target 16.2 to end all forms of violence against children and Sustainable Development Goal 5 to achieve gender equality and empower all women and girls.

In sub-Saharan Africa, SVAC is shaped by entrenched gender inequalities, poverty, and harmful social norms that normalize abuse and suppress disclosure [6]. Tanzania is no exception. Although the 2024 Violence Against Children and Youth Survey documented a decline in lifetime prevalence of childhood sexual violence among females from 33% (2009) to 11% (2024), formal help-seeking among survivors fell by 67% over the same period [7]. In Zanzibar specifically, over 1 in 20 females and 1 in 10 males aged 13–24 report experiencing sexual violence

before age 18, with abuse occurring predominantly within the home and broader community [8]. Persistent social norms, including intra-family confidentiality, survivor-blaming, and the belief that disclosure will compromise a survivor's marriageability, continue to undermine prevention and response [8].

Caregivers[1] occupy a central but frequently overlooked role in SVAC prevention. Evidence from parental-involvement interventions indicates that engaging caregivers can strengthen knowledge, attitudes, behavioral intentions, self-efficacy, response-efficacy, and other capabilities relevant to the prevention of child sexual abuse [9]. Parenting and caregiver-support interventions have also emerged as an important component of broader violence-prevention strategies in sub-Saharan Africa [6]. Despite this evidence, precise evaluations that explicitly target caregivers' knowledge, attitudes, and practices as primary outcomes remain scarce, particularly in LMICs.

Structured prevention toolkits have demonstrated effectiveness in improving child-level outcomes [10,11,12]. A systematic review of 13 randomized controlled trials found consistent improvements in children's knowledge of sexual abuse and their ability to protect themselves [11], while a meta-analysis of 31 rigorous studies found that programs with more than three sessions were significantly more effective than shorter interventions [12]. However, caregiver knowledge, attitudes, and practices outcomes are less frequently measured as primary endpoints, leaving an important evidence gap about whether toolkit-based programs change adult knowledge, attitudes, and practices [9]. In sub-Saharan Africa, caregiver-focused programs have been identified as promising approaches for reducing violence against children [6], and a parent-focused pilot in Zimbabwe demonstrated that structured caregiver sessions can normalize conversations about CSA, improve parental monitoring, and increase knowledge of where to access services [13]. In Tanzania, a cluster-randomized trial of the teacher-focused EmpaTeach intervention in Nyarugusu Refugee Camp found no statistically significant reduction in teacher-to-student physical violence [14]. By contrast, the multi-component Good School Toolkit in Uganda significantly reduced past-week physical violence from school staff to students [15]. Together, these findings underscore the importance of examining multi-level approaches that engage caregivers alongside children and other actors within children's social environments.

However, significant gaps persist in the evidence base. Systematic reviews indicate that caregiver involvement is an important component of child sexual abuse and broader violence prevention, while caregiver-focused outcomes and evidence from sub-Saharan African settings remain comparatively limited [6,9]. In Tanzania, evidence-based parenting support programs are being implemented, but research on their effectiveness, implementation, and scale-up remains limited [16].

[1] Caregivers in this context refers to parents, legal guardians, or caretakers of children aged 7 – 14 years.

The KUWAZA III program is a three-year, community-based, multi-component SVAC prevention and response intervention implemented in the North Unguja region of Zanzibar by a consortium comprising Pathfinder International Tanzania, Action Aid Tanzania, C-Sema, and the International Center for Research on Women (ICRW), and funded by the Oak Foundation. Its core component - a synchronized SVAC prevention training toolkit delivered to children aged 7–14 and their parents/caregivers, alongside religious and community leaders - represents a direct response to the normative and structural drivers of SVAC identified in the Zanzibar context. This toolkit was deployed over a 12-week period through weekly, two-hour sessions facilitated at community school hubs. The intervention was unique in its synchronized approach, delivering tailored modules to children (aged 7–14) and parents/caregivers at the same time. For parents/caregivers, nine structured sessions were designed to increase knowledge of legal protections, shift social norms from secrecy toward active listening, and build self-efficacy in discussing sensitive topics.

This paper reports caregiver-level findings from the KUWAZA III endline evaluation, examining the effect of the toolkit on caregivers' SVAC-related knowledge, beliefs and attitudes, self-efficacy, and communication practices. These findings address a documented gap in caregiver-focused SVAC prevention evidence in sub-Saharan Africa and contribute to the evidence base for scaling community-based prevention programs in Tanzania.

Methods

Study design

This study presents a secondary analysis of quantitative caregiver data collected as part of the KUWAZA III endline evaluation in North Unguja, Zanzibar. The original evaluation adopted a non-randomized, quasi-experimental research design involving quantitative household surveys in intervention and comparison shehias at baseline and endline to assess the effectiveness of the KUWAZA III toolkit in improving children and caregivers' knowledge, attitudes, practices, and self-efficacy related to the prevention of SVAC. The present analysis focuses specifically on outcomes among caregivers, drawing on the caregiver datasets generated during the baseline and endline assessments. The study employed repeated household surveys conducted at baseline (prior to implementation) and at endline following completion of the intervention. Random assignment was not feasible because KUWAZA shehias had been selected during earlier programme phases. The primary estimate was the effect of programme participation among caregivers who initiated the KUWAZA training; therefore, the intervention endline cohort was restricted to caregivers who attended at least one caregiver session. The comparison cohort comprised caregivers from shehias that did not receive the KUWAZA III training during the evaluation period.

To attribute impact and estimate causal effects, a difference-in-differences (DiD) approach was used to measure changes in outcomes across intervention and control groups over two time periods: baseline and endline. The DiD

design was selected because random allocation of communities was not feasible under routine programme implementation. By comparing changes over time between intervention and comparison communities, the approach controls secular trends that affect both groups equally and provides an estimate of programme effects. Because only one pre-intervention measurement was available, the parallel-trends assumption could not be tested empirically and was treated as an identifying assumption.

To further strengthen causal inference and minimize potential selection bias arising from the non-random allocation of intervention communities, Augmented Inverse Probability Weighting (AIPW) was applied to estimate the Average Treatment Effect on the Treated (ATET). AIPW combines propensity score weighting with outcome regression modelling, providing doubly robust estimates that remain consistent if either the treatment assignment model or the outcome model is correctly specified [17]. This analytical approach has increasingly been recommended for quasi-experimental evaluations of public health interventions because of its robustness to observed confounding and participant attrition [18].

Study setting

The study was conducted in the North A and North B districts of the Unguja North region of Zanzibar, Tanzania. The implementation area comprised 39 shehias (the lowest level of government administration in Zanzibar). Of these, 27 shehias were assigned to the intervention group, while 12 shehias served as the control group. Control communities were not exposed to the training using the KUWAZA III toolkit. Shehias were selected based on similar socio-demographic characteristics and located approximately 1.5 to 2 kilometers apart.

Unguja North has one of the highest proportions of children in Zanzibar and has consistently reported concerns related to child protection, including child neglect, physical violence, emotional abuse, and sexual violence. This informed the selection of the intervention area and the development of the KUWAZA III programme. The intervention and comparison shehias were selected to ensure broad comparability in terms of socio-economic characteristics, education levels, predominant livelihoods, access to schools, and availability of child protection structures. Geographic separation between intervention and control communities was intended to minimize contamination while maintaining contextual similarity.

Intervention

The KUWAZA III toolkit is a synchronized training program delivered over a 12-week period with one session per week. It consists of weekly, two-hour sessions facilitated at nearby schools as training venues. The intervention is unique in its deployment of synchronized modules to distinct cohorts simultaneously, including children (aged 7–10 and 11–14 years), caregivers, teachers, and community/religious leaders. For caregivers, the training focuses on: (1) enhancing knowledge of SVAC and legal protections, (2) shifting norms from family secrecy to active

listening, (3) building confidence in talking to children about sexual risks, and (4) strengthening trust in formal reporting mechanisms. The caregiver curriculum comprised a total of 12 sessions, including nine structured participatory sessions delivered by trained facilitators using standardized manuals, and the last three sessions involving development of community action plans to create safe environment for children. The sessions employed adult learning techniques including facilitated group discussions, storytelling, role play, case studies, reflective exercises, demonstrations, peer learning, and take-home materials to reinforce learning between sessions. Core content included understanding SVAC; recognizing grooming behaviors and warning signs; children's rights and national child protection laws; positive parenting; healthy communication between parents and children; age-appropriate sexuality education; challenging harmful gender norms and victim-blaming attitudes; responding appropriately to disclosure; referral pathways; and accessing health, legal, and psychosocial support services. The synchronized implementation model ensured that caregivers, teachers, children, and community/religious leaders received complementary messages during the same implementation period, thereby reinforcing protective behaviors across the socio-ecological environment surrounding the child.

Theory of change

The KUWAZA III programme was underpinned by a socio-ecological theory of change which recognizes that SVAC results from interacting factors operating at individual, interpersonal, community, and institutional levels. The intervention assumed that increasing caregivers' knowledge of sexual violence, strengthening positive parenting skills, challenging harmful gender and social norms, improving caregiver-child communication, and increasing awareness of reporting and referral pathways would lead to safer home environments and increased protection of children from sexual violence. Simultaneous engagement of caregivers, teachers, children, and community/religious leaders was expected to reinforce consistent protective norms across multiple levels of influence, ultimately contributing to reductions in children's vulnerability to sexual violence.

Specifically, the programme hypothesized that participation in the caregiver toolkit would result in immediate improvements in knowledge of SVAC, legal protections, and reporting mechanisms; intermediate outcomes including improved caregiver attitudes, reduced victim-blaming, increased caregiver self-efficacy, and improved communication with children; and longer-term outcomes comprising strengthened family protective behaviors, increased reporting of suspected abuse, improved access to child protection services, and ultimately reduced incidence of SVAC. Figure 1 illustrates the programme theory of change, highlighting the expected pathways through which programme inputs and activities contribute to outputs, outcomes, and ultimately the intended impact.

Figure 1: The Theory of change

Inputs	Activities	Outputs	Outcomes	Impact
•KUWAZA III synchronized training •Caregivers •Children •Teachers •Community & Religious Leaders	•Train caregivers on SVAC, child rights, and legal protection. •Build positive parenting and caregiver-child communication skills. •Facilitate community dialogue to challenge harmful gender norms, victim-blaming, and the culture of silence. •Strengthen awareness and utilization of reporting and referral pathways. •Engage caregivers teachers, children, and community/religious leaders through synchronized training modules.	• Caregivers trained on SVAC prevention and positive parenting. • Community stakeholders equipped to support child protection. • Caregivers acquire practical communication skills. • Community dialogue sessions conducted. • Functional referral linkages established with child protection services.	• Improved caregiver knowledge of SVAC and reporting mechanisms. • Improved caregiver attitudes and reduced victim-blaming. • Increased caregiver self-efficacy. • Improved caregiver-child communication on child safety and sexuality. • Strengthened positive parenting practices and protective community norms.	Safer families and communities with strengthened child protection systems, resulting in reduced vulnerability to and incidence of sexual violence against children in Zanzibar.

Study population

The study population consisted of caregiver-child dyads residing in the selected shehias. Eligibility for the caregivers' survey required participants to be the primary caregivers of a child aged 7–14 years living in the household. For the endline evaluation, inclusion criteria included participation in the baseline study and, for the intervention group, attendance in the training conducted by KUWAZA III. Caregivers who were unable to provide informed consent or who had resided in the study community for less than six months were excluded. The study focused on caregivers because they represented the primary target population for the caregiver toolkit and were expected to influence children's safety through parenting practices, communication, and help-seeking behaviors.

At endline, the intervention evaluation targeted caregivers who had completed the baseline survey and attended at least one KUWAZA caregiver session, consistent with the participation-based estimand. All baseline caregivers in comparison shehias remained eligible for endline follow-up because no training participation criterion applied to that group. Consequently, findings estimate change among caregivers who received at least some intervention exposure rather than the intention-to-treat effect of offering KUWAZA to every household initially interviewed.

Sample size determination

To obtain the appropriate sample size for pre-/post-test longitudinal cohort survey, the following formula was adopted [19].

$$N = \frac{2(z_\alpha + z_\beta)^2 \, (1 + (n-1)\rho)}{n[(\mu_1 - \mu_2)/\sigma]^2}$$

- σ2 is the assumed common variance in the two groups
- μ1 − μ2 is the difference in means of the two groups
- n is the number of timepoints
- ρ is the assumed correlation of the repeated measures
- zα is the value of the standardized score cutting off α/2 proportion of each tail of a standard normal distribution (for a two-tailed hypothesis test)
- zβ is the value of the standardized score cutting off the upper β proportion

Assuming zα = 1.96, 2-tailed 0.05 hypothesis test, zβ = 1.28, power = 0.9, effect size (μ1 − μ2)/σ = 0.5, n = 2 timepoints and ρ = 0.6 correlation of repeated measures.

$$N = \frac{2(1.96 + 1.28)^2 + (1 + (2-1) \times 0.6}{2 \times (0.5)^2} = \frac{33.59232}{0.5} = 67.2$$

Therefore, approximately 67 participants are needed in each group. Taking into consideration an attrition rate of 20% and non-response rate of 15%, the final sample size for each group is 90 subjects.

Sampling procedure and participant flow

A systematic household sampling frame was used across the 39 shehias. Sampling was conducted using a multistage approach. First, intervention and comparison shehias were purposively identified during programme design based on implementation plans and comparability of socio-demographic characteristics. Within each shehia, potentially eligible households were identified through community-based listing conducted with shehia leaders, Shehia Women and Children Coordinators, existing community groups, and word-of-mouth referral. Households were selected purposively. Priority was given to households with one or more predefined vulnerabilities: children not participating in KUWAZA-supported school clubs; irregular school or madrassa attendance; out-of-school children; child-headed households; a history of reported violence against children or women; economic hardship;

a caregiver with chronic illness; or a widow-headed household without a reliable source of income. Participation in the survey and subsequent training was voluntary. Where more than one eligible caregiver resided within a household, one caregiver was randomly selected for interview. Approval and support were secured from local community and political leaders, who assisted in identifying eligible caregivers. At endline, every effort was made to re-contact caregivers interviewed during baseline. Where respondents could not be located because of migration or other reasons, this information was documented and incorporated into the attrition analysis undertaken during statistical modelling.

At baseline in March 2023, of the 475 intervention caregivers, 270 (56.8%) initiated KUWAZA training from April to July 2023, followed by community action plans implementation from August to September 2023. Out of the 475 eligible caregivers, 270 participants constituted the treated cohort eligible for intervention endline follow-up, while 205 did not attend any session and were not targeted for the participation-based endline evaluation. Among the 270 caregivers treated, 120 (44.4%) attended all nine sessions that were targeted for caregivers, 159 (58.9%) attended at least five sessions, and 236 (87.4%) attended at least three sessions. These attendance categories are cumulative and therefore overlap.

At endline in October 2023, 218 of 270 treated intervention caregivers (80.7%) and 203 of 226 comparison caregivers (89.8%) were successfully recontacted and interviewed. Fifty-two intervention caregivers and 23 comparison caregivers were lost to follow-up, mainly because of travel or relocation during data collection. The final endline analytic sample comprised 421 caregivers: 218 intervention and 203 comparison participants. Figure 2 presents information on participants' flow across study phases for both study arms.

Figure 2. Participant flow through the KUWAZA III caregiver evaluation

Stage	Intervention	Comparison
Shehias selected	**27 pre-selected intervention shehias**	**12 comparison shehias**
↓	↓	↓
Households identified and enrolled into the programme	**475 households/caregivers (Eligible for enrollment into the study), March 2023**	**226 households/caregivers, March 2023**
↓	↓	↓

Stage	Intervention		Comparison
Intervention exposure	**270 attended ≥1 session (56.8%)** *Training (9 sessions) & Develop action plans (3 sessions): April – July 2023;* *Community action plans:* *August – September 2023.*	**205 Did not participate in the intervention (43.2%)**	**No KUWAZA III training**
Training exposure among treated caregivers	120 attended all 9 sessions (44.4%) 159 attended ≥5 sessions (58.9%) 236 attended ≥3 sessions (87.4%)	Not applicable	Not applicable
↓	↓		↓
Endline eligibility	**270 treated caregivers**	Not applicable	**226 baseline comparison caregivers**
↓	↓		↓
Successfully interviewed at endline	**218/270 (80.7%), October 2023**	Not applicable	**203/226 (89.8%), October 2023**
Lost to follow-up at endline	52/270 (19.3%)	Not applicable	23/226 (10.2%)
↓	↓		↓
Final endline analytic sample	**n = 218**	Not applicable	**n = 203**

Data collection

Quantitative data were collected using computer-assisted personal interviews via the Open Data Kit (ODK) interface. All study tools were prepared in English, professionally translated into Swahili, and back-translated to ensure consistency. The caregiver questionnaire was adapted from validated instruments used in previous child protection and violence prevention studies and aligned with the objectives of the KUWAZA III programme. The questionnaire contained modules on caregiver socio-demographic characteristics, knowledge of SVAC, awareness of legal protection mechanisms and reporting pathways, caregiver attitudes and beliefs, parent-child

communication practices, parenting behaviors, and caregiver self-efficacy. The same questionnaire was administered at baseline and endline to allow direct comparison of outcomes over time.

Prior to field implementation, all study instruments underwent expert review for content validity and were pre-tested in non-study communities with similar socio-demographic characteristics. Feedback from the pilot informed refinement of question wording, sequencing, translation, and skip patterns before commencement of data collection. Data collection was undertaken by trained enumerators with previous experience conducting household surveys. Enumerators received intensive training on study objectives, interview techniques, child safeguarding, research ethics, confidentiality, electronic data capture using ODK, and referral procedures for participants requiring psychosocial or child protection support. Field supervisors conducted routine spot checks, daily debriefing meetings, and real-time review of submitted questionnaires to ensure completeness and consistency of collected data.

Data management and quality assurance

Completed interviews were uploaded daily to a secure password-protected server where they underwent routine quality assurance checks before analysis. Electronic data capture minimized transcription errors through programmed skip logic, range checks, mandatory response fields, and automated consistency checks within the ODK platform.

Following data collection, datasets underwent comprehensive cleaning before statistical analysis. Data management procedures included: verification of participant identifiers, identification and removal of duplicate records, assessment of missing values and logical inconsistencies, verification of out-of-range values against original electronic records, standardization of variable names and coding structures across baseline and endline datasets, recoding of categorical variables into binary indicators for regression analysis, and generation of derived composite variables representing caregiver knowledge, attitudes, practices, and self-efficacy.

Data cleaning was performed iteratively by the evaluation team to ensure internal consistency between related variables before merging baseline and endline datasets for longitudinal analysis. Only fully anonymized datasets containing unique study identification numbers were retained for statistical analysis. Personally identifiable information was removed prior to analysis to safeguard participant confidentiality.

Outcome measures, coding, and study variables

Outcome measures were derived from a caregiver structured questionnaire adapted from established and previously validated CSA prevention measures. Caregiver attitudes and misconceptions were assessed using items adapted from Collings' Child Sexual Abuse Myth Scale [20], while knowledge of CSA characteristics and risks was informed by previously developed parental knowledge measures [21]. Caregiver–child communication was

assessed using items adapted from CSA prevention education measures [22], and caregiver self-efficacy, response efficacy, perceived severity and vulnerability, intentions, and preventive behaviors were informed by measures developed within a protection motivation theory framework [23]. Children's knowledge and protective skills were assessed using selected items adapted from the Children's Knowledge of Abuse Questionnaire [24,25], including understanding of abuse-related concepts, assertiveness, disclosure, and help-seeking, together with concepts from the Touch Continuum framework [26] concerning safe, unsafe, and confusing touch. Selected concepts relating to recognition of possible CSA were also informed by Salvagni and Wagner [27]. Items were contextualized to align with the KUWAZA intervention and Zanzibar setting and translated into Swahili.

The caregiver questionnaire items were mapped to four conceptual domains: knowledge, attitudes and beliefs, self-efficacy, and protective practices. Knowledge outcomes assessed recognition of SVAC forms and risk, awareness of protective mechanisms, and knowledge of informal and formal reporting channels. Attitude outcomes covered willingness to discuss SVAC, positive discipline, rejection of family silence and victim-blaming, and gender-equitable beliefs and attitudes toward sexuality education. Self-efficacy outcomes assessed confidence in discussing SVAC with children and other stakeholders and confidence in supporting disclosure, reporting, and referral. Protective-practice outcomes captured discussions about SVAC prevention, caregiver–child sexuality education, and communication about sexual-risk reduction.

For item-level analysis, each response was recoded as 1 when it represented the predefined correct, protective, or favorable response and 0 otherwise. Reverse-worded items were coded in the protective direction. The item-to-outcome mapping and correct-response codes were specified before outcome analysis and applied consistently at baseline and endline. Multi-item outcome indicators were generated from their constituent binary items using the prespecified scoring algorithm. Results are presented as proportions meeting each outcome definition, so effect estimates are interpretable as percentage-point differences.

Outcome construction and composite variables

To improve measurement reliability and reduce the influence of individual questionnaire items, composite outcome variables were created for each major study domain. Composite scores were generated by summing correctly answered or positively endorsed items within each construct and subsequently converting the total scores into binary outcomes using predetermined cut-off points derived from the evaluation protocol. Fifteen outcome variables were developed, as shown in Table 2, and grouped into three groups: (1) Changes in caregiver knowledge outcomes; (2) Changes in caregiver attitudes and beliefs; and (3) Changes in caregiver practices and self-efficacy. Binary outcome variables were subsequently used as dependent variables in DiD regression models and AIPW analyses to estimate intervention effects.

Internal reliability testing

Internal consistency of multi-item scales was evaluated using Cronbach's alpha coefficient prior to construction of composite variables. A Cronbach's alpha value of ≥0.70 was considered indicative of acceptable internal reliability, consistent with commonly accepted psychometric standards. Reliability testing was undertaken separately for the knowledge, attitudes, practices, and self-efficacy scales. Items demonstrating poor item-total correlations or reducing overall reliability were reviewed before inclusion in the final composite indices. The use of internally consistent composite variables improved measurement precision by reducing random measurement error and providing more stable estimates of caregiver knowledge, attitudes, practices, and self-efficacy than individual questionnaire items alone.

Statistical analysis

Quantitative data were cleaned and analyzed using R (version 4.6.1) and R Studio (2026.06.0). Descriptive statistics were first generated to summarize the socio-demographic characteristics of study participants. Categorical variables were summarized using frequencies and percentages, while continuous variables (where applicable) were summarized using means with standard deviations or medians with interquartile ranges, depending on the distribution of the data. Baseline characteristics were compared between intervention and comparison groups to assess the comparability of study populations before implementation of the intervention.

Bivariate analyses were undertaken to examine changes in caregiver knowledge, attitudes, practices, and self-efficacy between baseline and endline within each study arm. Pearson's Chi-square (χ^2) test was used to compare categorical variables, while crude Odds Ratios (ORs) with corresponding 95% Confidence Intervals (CIs) were estimated using binary logistic regression to quantify the magnitude and direction of change over time.

Difference-in-Differences (DiD) analysis

To estimate the adjusted difference-in-differences association between participation in the KUWAZA III caregiver toolkit and caregiver outcomes, DiD regression models were fitted for each caregiver outcome. The DiD estimator compared the change in outcomes over time between intervention and comparison communities while controlling for secular trends affecting both groups. The interaction term between study arm and survey period represented the programme impact estimate.

The DiD model was specified as:

$$Y_i = \beta_0 + \beta_1 \text{Treatment}_i + \beta_2 \text{Post}_i + \beta_3 (\text{Treatment}_i \times \text{Post}_i) + \varepsilon_i$$

where:

- Y_i = the caregiver outcome of interest (knowledge, attitude, practice, or self-efficacy);

- (beta_0) = the intercept;
- (Treatment}_i) = a binary indicator of study group (1 = intervention; 0 = control);
- (Post_i) = a binary indicator of survey period (1 = endline; 0 = baseline);
- (Treatment}_i x Post_i) = the interaction term representing the DiD estimator;
- (β_3) = the coefficient of primary interest and estimates the average intervention effect after accounting for baseline differences and secular trends common to both study groups; and
- (\varepsilon_i) = the random error term.

For binary outcomes, multivariable logistic regression models were fitted and adjusted Odds Ratios (AORs) with 95% CIs were reported. The interaction coefficient represented the independent programme effect after accounting for baseline differences between intervention and comparison communities.

Augmented Inverse Probability Weighting (AIPW)

Because allocation of intervention communities was not randomized, AIPW was employed to strengthen causal inference and minimize bias resulting from observed differences between intervention and comparison groups.

AIPW is a doubly robust causal inference estimator that combines two complementary statistical approaches:

1. a propensity score model estimating the probability of receiving the intervention; and
2. an outcome regression model predicting caregiver outcomes.

Under standard identification assumptions, the AIPW estimator is doubly robust, meaning that it is consistent if either the treatment model or the outcome model is correctly specified. .

The propensity score was estimated using logistic regression:

[P(T=1|X)=Pr(Treatment=1|X)]

where (X) represented observed caregiver and household characteristics measured at baseline.

Inverse probability weights were then generated as:

[w_i=\frac{T_i}{\hat e(X_i)}+\frac{1-T_i}{1-\hat e(X_i)}]

where (\hat e(X_i)) denotes the estimated propensity score for participant (i).

Average Treatment Effect on the Treated (ATET)

The primary causal parameter estimated using AIPW was the ATET, representing the average improvement attributable to participation in the caregiver toolkit among caregivers who actually received the intervention.

The ATET is defined as:

[ATET=E[Y(1)-Y(0)\mid T=1]]

where:

- (Y(1)) represents the potential outcome if exposed to the intervention;
- (Y(0)) represents the counterfactual outcome had the same caregiver not received the intervention;
- (T=1) denotes caregivers who participated in the KUWAZA III training.

ATET estimates were reported as regression coefficients with robust standard errors, 95% CIs, and corresponding p-values.

The AIPW analysis was selected because it accounts for differential loss to follow-up and observed baseline imbalances while producing more robust estimates of programme impact than conventional regression methods alone.

Statistical significance

All statistical tests were two-sided. Statistical significance was assessed at an alpha level of 0.05, and p-values less than 0.05 were considered statistically significant. 95% CIs were calculated for all ORs and ATET estimates.

Ethical considerations

The study protocol was reviewed and approved by the Zanzibar Research Committee (IRB number 800200005403) and administrative permission was obtained from the Office of the Second Vice President of the Revolutionary Government of Zanzibar (Ref: CCA.33/411/01/).

Participation was voluntary. Written informed consent was obtained from all participating caregivers before interviews were conducted. Participants were informed about the objectives of the study, expected duration of the interview, voluntary nature of participation, potential risks and benefits, confidentiality safeguards, and their right to decline participation or withdraw from the study at any stage without penalty. Because the present manuscript reports a secondary analysis of the endline evaluation data, only fully de-identified datasets were used. All personal identifiers had been removed prior to analysis, and analyses were conducted using anonymized participant identification numbers to maintain confidentiality. Electronic datasets were stored on password-protected

computers accessible only to authorized members of the research team. No names or personal identifying information were included in the analytical dataset or reported in study findings.

A response plan was in place to refer participants to appropriate health and child protection services if needed. Given the sensitive nature of SVAC, referral procedures were established before fieldwork commenced. Participants requiring psychosocial support, medical care, legal assistance, or child protection services were referred through existing government and partner-supported referral pathways. Enumerators received training on ethical interviewing, child safeguarding principles, and appropriate management of participant distress or disclosure of violence during data collection.

Results

Characteristics of the study population

A total of 421 caregivers participated in the endline survey, comprising 218 caregivers from the intervention communities and 203 from the control communities (Table 1). Women constituted the majority of respondents in both study arms (89% intervention vs. 92% control). Approximately seven in ten caregivers were aged over 34 years (69.7% intervention; 76.8% control), while only 3.8% were aged 18–24 years (4.1% intervention; 3.4% control). Employment levels were high across both study arms, with 99.5% of caregivers in the intervention group and 97.5% of caregivers in the control group reporting being employed. Approximately three-quarters of caregivers were married (74.8% intervention vs. 70.9% control; p=0.376).

Educational attainment differed significantly between the study arms (p<0.001). Among intervention caregivers, 40.4% had no formal education, 33.0% had primary education, and 26.6% had post-primary education, compared with 28.1%, 25.1%, and 46.8%, respectively, among control caregivers. Thus, while sex, age, employment, and marital status did not differ significantly between the study arms, the control group had a substantially higher proportion of caregivers with post-primary education. This baseline difference in educational attainment was accounted for in the adjusted analyses.

Table 1. Socio-demographic characteristics of caregivers at endline by study arm

Characteristic	Intervention (n=218)	Control (n=203)	Total (N=421)	p-value
Sex				Pearson chi-square, p = 0.345
Male	23 (10.6%)	16 (7.9%)	39 (9.3%)	
Female	195 (89.4%)	187 (92.1%)	382 (90.7%)	

Age group				Pearson chi-square, p = 0.360
18–24 years	9 (4.1%)	7 (3.4%)	16 (3.8%)	
25–34 years	54 (24.8%)	40 (19.7%)	94 (22.3%)	
>34 years	152 (69.7%)	156 (76.8%)	308 (73.2%)	
Missing	3 (1.4%)	0 (0.0%)	3 (0.7%)	
Employment status				Fisher's exact, p = 0.200
Employed	217 (99.5%)	198 (97.5%)	415 (98.6%)	
Not employed	1 (0.5%)	4 (2.0%)	5 (1.2%)	
Missing	0 (0.0%)	1 (0.5%)	1 (0.2%)	
Education level				Pearson chi-square, p = <0.001*
None	88 (40.4%)	57 (28.1%)	145 (34.4%)	
Primary	72 (33.0%)	51 (25.1%)	123 (29.2%)	
Post-primary	58 (26.6%)	95 (46.8%)	153 (36.3%)	
Marital status				Pearson chi-square, p = 0.376
Married	163 (74.8%)	144 (70.9%)	307 (72.9%)	
Unmarried	55 (25.2%)	59 (29.1%)	114 (27.1%)	

Changes in caregiver knowledge outcomes

Table 2 summarizes changes in caregiver knowledge between baseline and endline within each study arm. In the intervention group, the proportion of caregivers with high knowledge of SVAC forms increased modestly from 54.1% at baseline to 57.3% at endline, although this change was not statistically significant (OR=1.14, 95% CI: 0.83–1.58; p=0.427). Similarly, knowledge of legal protection mechanisms remained largely unchanged (60.2% vs. 61.0%; OR=1.03, 95% CI: 0.75–1.44; p=0.842), as did knowledge of informal and formal reporting channels.

Table 2. Changes in caregiver knowledge, attitude and practices between baseline and endline by study arm

	Intervention Group*	**Control Group***

Outcome	Baseline % (n/N)	Endline % (n/N)	Crude OR (95% CI)	P value	Baseline % (n/N)	Endline % (n/N)	Crude OR (95% CI)	P value
Changes in caregiver knowledge outcomes								
High knowledge of SVAC forms	54.1% (257/475)	57.3% (125/218)	1.14 (0.83–1.58)	0.427	24.3% (55/226)	18.2% (37/203)	0.69 (0.43–1.1)	0.476
High knowledge of legal protection mechanisms	60.2% (286/475)	61% (133/218)	1.03 (0.75–1.44)	0.842	69.3% (156/225)	77.3% (157/203)	1.51 (0.98–2.34)	0.908
High knowledge of informal reporting channels	32.8% (156/475)	33% (72/218)	1.01 (0.71–1.42)	0.962	33.3% (75/225)	32.5% (66/203)	0.96 (0.64–1.44)	0.99
High knowledge of formal reporting channels	5.9% (28/475)	6.9% (15/218)	1.18 (0.6–2.23)	0.618	6.7% (15/225)	5.9% (12/203)	0.88 (0.39–1.92)	0.741
Changes in caregiver attitudes and beliefs								
Willingness to discuss SVAC	86.9% (413/475)	83% (181/218)	0.73 (0.47–1.15)	0.21	91.6% (206/225)	93.1% (189/203)	1.25 (0.61–2.6)	0.676
Positive attitude on child discipline	15.2% (72/475)	12.8% (28/218)	0.82 (0.51–1.31)	0.491	19.6% (44/225)	25.1% (51/203)	1.38 (0.87–2.19)	0.205
Rejecting the culture of silence	97.1% (461/475)	95.9% (209/218)	0.71 (0.3–1.72)	0.564	92.9% (210/226)	89.1% (180/202)	0.62 (0.31–1.22)	0.225
Rejection of victim-blaming attitudes	22.7% (108/475)	46.8% (102/218)	2.99 (2.12–4.21)	**<0.001**	35.8% (81/226)	36.6% (74/202)	1.03 (0.7–1.54)	0.944
Equal rights between boys and girls	30.3% (144/475)	33.5% (73/218)	1.16 (0.82–1.63)	0.455	36.7% (83/226)	37.9% (77/203)	1.05 (0.71–1.56)	0.875
Positive attitudes about sexuality education	82% (336/410)	91.2% (187/205)	2.29 (1.35–4.06)	**0.004**	75.6% (121/160)	88.5% (100/113)	2.48 (1.28–5.06)	0.012
Changes in caregiver practices and self-efficacy								
Discussed SVAC prevention in past month	72.4% (344/475)	72% (157/218)	0.98 (0.69–1.41)	0.912	47.3% (106/224)	49.8% (101/203)	1.1 (0.75–1.61)	0.616
Sexual education communication to child	40.8% (194/475)	40.4% (88/218)	0.98 (0.71–1.36)	0.906	48.4% (109/225)	53.7% (109/203)	1.23 (0.84–1.81)	0.278

Sexual risk reduction communication to child	63.6% (302/475)	54.6% (119/218)	0.69 (0.5–0.95)	**0.025**	68.4% (154/225)	69% (140/203)	1.02 (0.68–1.54)	0.908
High caregiver self-efficacy on SVAC prevention	83.2% (395/475)	87.6% (191/218)	1.43 (0.91–2.33)	0.163	87.2% (197/226)	75.9% (154/203)	0.46 (0.28–0.76)	0.004
Caregiver self-efficacy in Parenting on sexuality issues	94.3% (448/475)	94% (205/218)	0.95 (0.49–1.94)	0.99	93.3% (210/225)	95.1% (193/203)	1.38 (0.61–3.24)	0.575

**Where the denominator is less than the overall N, is due to no-response or missing values.*

Within the control group, knowledge of legal protection mechanisms increased from 69.3% to 77.3%; however, this increase was also not statistically significant (OR=1.51, 95% CI: 0.98–2.34). No significant changes were observed for knowledge of SVAC forms, informal reporting channels, or formal reporting mechanisms.

The multivariable DiD analysis (Table 3) similarly showed no statistically significant intervention effect on caregiver knowledge outcomes after adjusting for socio-demographic characteristics. Although caregivers in intervention communities had higher odds of reporting knowledge of SVAC forms than controls (AOR=1.72, 95% CI: 0.96–3.11), the association did not reach statistical significance (p=0.068). Likewise, no significant intervention effects were observed for knowledge of legal protection mechanisms, informal reporting channels, or formal reporting channels.

Results from the Augmented Inverse Probability Weighting analysis estimating the average treatment effect on the treated (ATET; Table 4), however, suggested a significant average treatment effect for knowledge of SVAC forms (ATET=0.413, SE=0.049; 95% CI: 0.317–0.510; p<0.001), indicating that participation in the SVAC toolkit was associated with an increased probability of correctly identifying forms of sexual violence. Conversely, a negative treatment effect was observed for knowledge of legal protection mechanisms (ATET=−0.154, SE=0.052; 95% CI: −0.256 to −0.053; p=0.003), while no significant effects were detected for knowledge of reporting channels.

Table 3. Difference-in-differences impact of the SVAC toolkit on caregiver outcomes

Outcome	DID Estimate (β)	Adjusted OR*	95% CI	p value
High knowledge of SVAC forms	0.545	1.72	0.96–3.11	0.068
High knowledge of legal protection mechanisms	-0.332	0.72	0.41–1.25	0.243
High knowledge of informal reporting channels	0.133	1.14	0.66–1.97	0.633
High knowledge of formal reporting channels	0.108	1.11	0.39–3.2	0.841
Willingness to discuss SVAC	-0.618	0.54	0.22–1.27	0.161
Positive attitude on child discipline	-0.625	0.54	0.27–1.05	0.071
Rejecting the culture of silence	0.176	1.19	0.39–3.79	0.761

Rejection of victim blaming attitudes	1.086	2.96	1.73–5.08	**<0.001**
Equal rights between boys and girls	0.224	1.25	0.73–2.14	0.412
Positive attitudes about sexuality education to child	-0.207	0.81	0.33–1.98	0.65
High caregiver self-efficacy	1.202	3.33	1.66–6.82	**<0.001**
Caregiver self-efficacy in Parenting on sexuality issues	-0.352	0.7	0.23–2.1	0.527
Discussed SVAC prevention in past month	-0.104	0.9	0.53–1.55	0.704
Sexual Education Communication to child	-0.273	0.76	0.45–1.28	0.305
Sexual Risk Reduction Communication to child	-0.484	0.62	0.36–1.06	0.078

***** The adjusted OR is the exponentiated coefficient for the intervention-by-time interaction term

Changes in caregiver attitudes and beliefs

Overall, caregivers reported high levels of positive attitudes towards discussing sexual violence with children throughout the study period. More than 95% of caregivers in both study arms indicated willingness to discuss SVAC with children at both baseline and endline, with no statistically significant within-group changes.

A notable improvement was observed in rejection of victim-blaming attitudes within the intervention group, increasing from 22.7% at baseline to 46.8% at endline (OR=2.99, 95% CI: 2.12–4.21; p<0.001). In contrast, no meaningful change occurred in the control group (35.8% vs. 36.6%; OR=1.03, 95% CI: 0.70–1.54; p=0.944).

Positive attitudes towards sexuality education also improved significantly in both study arms. In the intervention group, the proportion increased from 82.0% to 91.2% (OR=2.29, 95% CI: 1.35–4.06; p=0.004), while the control group increased from 75.6% to 88.5% (OR=2.48, 95% CI: 1.28–5.06; p=0.012).

The adjusted DiD analysis identified rejection of victim-blaming attitudes as the only attitude outcome significantly associated with the intervention (AOR=2.96, 95% CI: 1.73–5.08; p<0.001). No statistically significant intervention effects were observed for willingness to discuss SVAC, positive child discipline, rejection of the culture of silence, equal rights between boys and girls, or positive attitudes towards sexuality education.

The AIPW estimates provided additional evidence of a positive effect on rejection of victim-blaming attitudes (ATET=0.159, SE=0.054; 95% CI: 0.052–0.265; p=0.003). Conversely, modest negative treatment effects were observed for willingness to discuss SVAC (ATET=−0.090, SE=0.042; 95% CI: −0.172 to −0.008; p=0.032) and attitudes towards child discipline (ATET=−0.174, SE=0.053; 95% CI: −0.277 to −0.070; p<0.001). A modest positive treatment effect was also observed for rejection of the culture of silence (ATET=0.068, SE=0.032; 95% CI: 0.005–0.130; p=0.033). No significant treatment effects were detected for equal rights between boys and girls or positive attitudes towards sexuality education.

Table 4. Average Treatment Effect on the Treated (ATET)

Outcome	ATET Coefficient	Robust SE	95% CI	p value
High knowledge of SVAC forms	0.413	0.049	0.317 to 0.51	**<0.001**
High knowledge of legal protection mechanisms	-0.154	0.052	-0.256 to -0.053	**0.003**
High knowledge of informal reporting channels	-0.018	0.059	-0.134 to 0.097	0.755
High knowledge of formal reporting channels	0.017	0.023	-0.029 to 0.063	0.471
Willingness to discuss SVAC	-0.09	0.042	-0.172 to -0.008	**0.032**
Positive attitude on child discipline	-0.174	0.053	-0.277 to -0.07	**<0.001**
Rejecting the culture of silence	0.068	0.032	0.005 to 0.13	**0.033**
Rejection of victim blaming attitudes	0.159	0.054	0.052 to 0.265	**0.003**
Equal rights between boys and girls	0.01	0.057	-0.102 to 0.123	0.856
Positive attitudes about sexuality education to child	0.05	0.057	-0.062 to 0.163	0.381
High caregiver self-efficacy	0.039	0.039	-0.038 to 0.116	0.322
Caregiver self-efficacy in Parenting on sexuality issues	0.009	0.03	-0.05 to 0.067	0.766
Discussed SVAC prevention in past month	0.229	0.058	0.116 to 0.341	**<0.001**
Sexual Education Communication to child	-0.173	0.057	-0.285 to -0.061	**0.002**
Sexual Risk Reduction Communication to child	-0.157	0.054	-0.263 to -0.052	**0.003**

Changes in caregiver prevention practices and self-efficacy

Within-group analyses revealed relatively stable caregiver communication practices over time. The proportion of caregivers discussing SVAC prevention with children remained unchanged in the intervention group (72.4% vs. 72.0%; OR=0.98, 95% CI: 0.69–1.41; p=0.912) and showed a similarly small change in the control group.

Communication on sexuality education likewise remained relatively stable in both groups. However, communication regarding sexual risk reduction declined significantly within the intervention communities, decreasing from 63.6% to 54.6% (OR=0.69, 95% CI: 0.50–0.95; p=0.025).

Caregiver self-efficacy for preventing SVAC remained high throughout the study period. Although self-efficacy increased slightly within intervention communities (83.2% to 87.6%), the difference was not statistically significant. In contrast, caregiver self-efficacy declined significantly within the control group (87.2% to 75.9%; OR=0.46, 95% CI: 0.28–0.76; p=0.004). Self-efficacy related to parenting on sexuality issues remained consistently high (>93%) in both study arms.

The adjusted DiD analysis demonstrated that caregivers receiving the SVAC toolkit had significantly greater odds of high caregiver self-efficacy than caregivers in control communities (AOR=3.33, 95% CI: 1.66–6.82; p<0.001).

No statistically significant intervention effects were observed for discussions on SVAC prevention, communication on sexuality education, sexual risk reduction communication, or parenting self-efficacy.

The AIPW analysis demonstrated a significant positive treatment effect for caregiver discussions on SVAC prevention (ATET=0.229, SE=0.058; 95% CI: 0.116–0.341; p<0.001). However, negative treatment effects were observed for communication regarding sexuality education (ATET=−0.173, SE=0.057; 95% CI: −0.285 to −0.061; p=0.002) and sexual risk reduction (ATET=−0.157, SE=0.054; 95% CI: −0.263 to −0.052; p=0.003), while no significant effects were found for caregiver self-efficacy measures.

Summary of intervention effects

Across all caregiver outcomes examined, the intervention was associated with meaningful shifts in selected attitudes, knowledge, and caregiver competencies. The adjusted DiD analysis identified statistically significant positive associations for rejection of victim-blaming attitudes and high caregiver self-efficacy, while no significant DiD effects were observed for most knowledge, communication, or other attitude outcomes. The AIPW analysis identified positive ATETs for knowledge of SVAC forms, rejection of victim-blaming attitudes, rejection of the culture of silence, and caregiver-child discussions on SVAC prevention. Conversely, statistically significant negative ATETs were observed for knowledge of legal protection mechanisms, willingness to discuss SVAC, attitudes toward child discipline, sexuality-education communication, and sexual-risk-reduction communication. Because several AIPW findings were not supported by the DiD analysis, these estimates should be interpreted cautiously and in light of the different assumptions underlying the two analytical approaches. .

Discussion

This study evaluated the effectiveness of the KUWAZA III SVAC prevention toolkit in improving caregivers' knowledge, attitudes, and preventive practices in Zanzibar, Tanzania. Overall, the findings demonstrate that the toolkit had a positive but targeted effect on caregiver outcomes. While statistically significant improvements were observed in caregivers' rejection of victim-blaming attitudes and caregiver self-efficacy in the DiD analysis, the AIPW analysis additionally identified positive treatment effects on caregivers' knowledge of forms of sexual violence and discussions on SVAC prevention with children. Most other knowledge domains and preventive practices showed limited or inconsistent changes following the intervention. These findings suggest that community-based caregiver interventions can effectively influence selected caregiver competencies, protective behaviors, and attitudes but may require longer implementation periods and stronger systems support to achieve broader changes in caregiver knowledge and practices. Similar conclusions were reached in the KUWAZA III endline evaluation [8], which found that the toolkit was particularly successful in stimulating dialogue on child protection while highlighting the persistence of knowledge gaps related to legal reporting mechanisms and formal child protection systems.

One of the most important findings was the improvement in caregivers' knowledge of forms of sexual violence identified through the AIPW analysis. Although the unadjusted and DiD analyses did not demonstrate statistically significant improvements across most knowledge indicators, the AIPW analysis showed a significant positive treatment effect among caregivers exposed to the toolkit. This finding illustrates the value of combining conventional regression approaches with causal inference methods when evaluating complex community interventions. AIPW combines propensity score and outcome regression models, providing doubly robust estimation under the assumptions of the approach [17,18]. The discrepancy between the DiD and AIPW findings may also reflect relatively high baseline knowledge levels among caregivers, leaving limited room for measurable improvement using conventional analyses.

The observed improvement in knowledge is consistent with evidence from other caregiver-focused violence prevention programmes. In Zimbabwe, the Families Matter! Program improved caregivers' knowledge and skills related to preventing and responding to CSA, including knowledge of where to access services following abuse [13]. Evidence from systematic reviews similarly indicates that parental and caregiver involvement can improve outcomes relevant to the prevention of violence against children [6,9]. These findings reinforce growing evidence that caregiver education is an essential component of comprehensive violence prevention strategies.

Despite these gains, the DiD analysis did not demonstrate a significant intervention effect on caregivers' knowledge of legal protection mechanisms or formal reporting pathways. The AIPW analysis, however, identified a significant negative treatment effect for knowledge of legal protection mechanisms, while no significant effects were detected for knowledge of reporting channels. Legal literacy is inherently more complex than recognizing abusive behaviors and often requires repeated reinforcement and practical exposure to child protection services. The KUWAZA III evaluation similarly noted that although caregivers increasingly recognized sexual violence as unacceptable, many remained uncertain about where and how to report suspected abuse [8]. Future implementation should therefore strengthen modules on reporting procedures by incorporating practical case scenarios, role play, and direct engagement with police, social welfare officers, and community child protection committees.

The intervention demonstrated its strongest and most consistent effects in changing caregiver attitudes, particularly through reducing victim-blaming attitudes. Both the DiD and AIPW analyses consistently showed that caregivers exposed to the toolkit were significantly more likely to reject beliefs that hold children responsible for sexual violence. Victim-blaming is a harmful attitude that can discourage disclosure, delay care seeking, and reinforce stigma among survivors. Reducing these attitudes therefore represents an important step toward creating supportive family environments where children are more likely to disclose abuse and receive timely assistance.

The improvement in attitudes likely reflects the participatory design of the KUWAZA toolkit, which encouraged caregivers to examine prevailing gender norms, parenting practices, and beliefs about children's rights through

facilitated group discussions and reflection exercises. Behavior change theories emphasize that interactive learning approaches can support changes in deeply held beliefs by encouraging participants to question existing norms collectively.

Interestingly, positive attitudes towards sexuality education improved in both intervention and comparison communities, and the DiD analysis did not demonstrate an independent programme effect. This pattern suggests that broader contextual factors, including national child protection campaigns, school-based sexuality education initiatives, or increased public discussion of child protection during the implementation period may have influenced caregiver attitudes.

Overall, the findings indicate that the KUWAZA III toolkit was particularly effective in addressing harmful attitudes associated with child sexual violence while producing more modest or inconsistent improvements in broader knowledge domains. This pattern is consistent with evidence suggesting that participatory caregiver interventions can influence parenting attitudes, relationships, and protective behaviors, all of which represent important components of violence prevention [6,9,28,29].

The intervention also demonstrated meaningful effects on caregiver communication, an important intermediate outcome in preventing SVAC. Although within-group analyses showed relatively little change in communication practices over time and the DiD analysis did not identify a significant intervention effect on discussions about SVAC prevention, the AIPW analysis found a significant positive treatment effect for caregiver-child discussions on SVAC prevention. Caregiver-child communication is an important component of parental involvement in child sexual abuse prevention and can support children's knowledge, communication, and protective behaviors [9,13,28,30]. The AIPW finding therefore suggests that the toolkit may have strengthened caregiver-child discussions regarding SVAC prevention, although the absence of a corresponding significant DiD effect warrants cautious interpretation.

These findings are consistent with evidence from other caregiving interventions implemented in sub-Saharan Africa. The Families Matter! Program demonstrated improvements in caregiver-child communication following structured parenting sessions [30]. Likewise, the Parenting for Lifelong Health programme reported improvements in parenting and family relationships in South Africa [29]. Systematic review evidence from sub-Saharan Africa similarly indicates that family- and caregiver-focused interventions can contribute to violence prevention through improvements in parenting practices and parent-child relationships [6]. Together, these studies support the premise that strengthening caregiver communication represents an important outcome of community-based violence prevention programmes.

Despite these encouraging findings, improvements were not observed across all behavioral outcomes. The AIPW analysis identified negative treatment effects for communication regarding sexuality education and sexual risk reduction, while the corresponding DiD effects were not statistically significant. These findings should be interpreted

cautiously. Behavioral change is generally more difficult to achieve than changes in knowledge or attitudes because it requires repeated practice, reinforcement, and supportive social environments. The Social Ecological Model suggests that parenting behaviors are shaped not only by individual knowledge but also by family relationships, community norms, religious beliefs, and access to supportive services [31,32]. Consequently, short-term community interventions may successfully influence intentions and attitudes before measurable changes in everyday parenting practices become evident.

The apparent decline in communication on sexuality education and sexual risk reduction identified in the AIPW analysis warrants careful interpretation. One possible explanation is that increased caregiver understanding of what constitutes comprehensive sexuality communication following the intervention may have influenced how caregivers subsequently reported their practices. As caregivers became more aware of age-appropriate communication, they may have reported their practices more accurately than at baseline, reducing the likelihood of over-reporting socially desirable behaviors. However, this explanation could not be assessed directly in the present study. The KUWAZA III evaluation also noted that cultural discomfort surrounding discussions of sexuality with children remained an important barrier despite increased awareness of the importance of such conversations [8].

Caregiver self-efficacy remained high throughout the study period. The adjusted DiD analysis showed that caregivers exposed to the toolkit had significantly greater odds of high caregiver self-efficacy compared with caregivers in control communities. However, the AIPW analysis did not identify significant treatment effects for either self-efficacy measure. Baseline self-efficacy exceeded 80% for most indicators, suggesting a possible ceiling effect that may have limited the potential for measurable improvement. Moreover, confidence alone does not guarantee behavior change. These findings suggest that future iterations of the KUWAZA toolkit could benefit from refresher sessions, peer-support groups, mentoring, and supervised practice to reinforce newly acquired parenting skills beyond the initial training period.

A notable strength of this evaluation was the application of complementary analytical approaches. While crude comparisons provided useful descriptive evidence, the DiD analysis accounted for changes over time affecting both intervention and comparison communities, and the AIPW analysis further addressed observed differences between groups using propensity score weighting and outcome regression [17,18]. The consistency of the positive association for rejection of victim-blaming attitudes across the DiD and AIPW analyses provides supportive evidence for this finding, although residual confounding and the assumptions of both approaches cannot be excluded. The use of complementary quasi-experimental methods therefore strengthens the contribution of this study to the evidence base on community-based child protection interventions.

This study has additional strengths. First, it evaluated the effectiveness of an intervention implemented under routine programme conditions, increasing the relevance of the findings for policy and practice. Second, the

inclusion of a comparison group and baseline and endline assessments strengthened internal validity relative to a simple pre-post evaluation. Third, the intervention addressed multiple determinants of child protection, including knowledge, attitudes, communication, and parenting practices, reflecting the multidimensional nature of sexual violence prevention. Finally, the study contributes important evidence from Zanzibar, where rigorous evaluations of caregiver-focused SVAC prevention programmes remain limited.

Several limitations should be acknowledged. The quasi-experimental design did not include random allocation, leaving the possibility of residual confounding despite statistical adjustment. In addition, only 56.8% of caregivers enrolled in intervention communities attended at least one caregiver session. Restricting the primary analytic cohort to participants who initiated the intervention means that the findings do not represent the intention-to-treat effect of offering KUWAZA to all eligible caregivers and may be affected by selection into intervention participation. Most outcomes were based on caregiver self-report and were therefore susceptible to recall and social desirability bias, particularly for sensitive issues such as parenting behaviors and sexuality communication. The follow-up period may also have been insufficient to capture changes in deeply embedded social norms and parenting practices, which often require sustained engagement over several years. Additionally, heterogeneity in intervention exposure and differences in caregiver participation between baseline and endline may have influenced the estimated intervention effects. Finally, the present study focused specifically on caregiver outcomes and did not directly examine whether observed changes among caregivers translated into reductions in children's exposure to sexual violence or improvements in child wellbeing. Detailed findings focusing on children are available in the KUWAZA III evaluation report [8].

The findings have several implications for policy and programming. First, they support continued investment in caregiver-focused interventions as part of comprehensive strategies to prevent violence against children. The results align with the WHO's INSPIRE framework, which identifies parent and caregiver support as a core strategy for reducing violence against children [2]. Integrating the KUWAZA toolkit into existing community health, education, and social welfare systems could facilitate sustainable scale-up while strengthening community ownership. Second, future adaptations of the toolkit should strengthen content on legal literacy, reporting mechanisms, and referral pathways while incorporating booster sessions to reinforce behavior change. Greater engagement of fathers and male caregivers should also be prioritized, given their limited participation in this study and their important influence on household decision-making and child protection.

Future research should examine whether improvements in caregiver knowledge, attitudes, communication, and self-efficacy are sustained over time and whether they translate into measurable reductions in children's experiences of sexual violence. Longitudinal studies incorporating child-reported outcomes, service utilization data, and community-level indicators would provide stronger evidence regarding the long-term effectiveness and scalability of caregiver-based SVAC prevention programmes.

Conclusion

The KUWAZA III caregiver toolkit demonstrated measurable effectiveness in improving selected caregiver competencies associated with the prevention of SVAC. Among caregivers who initiated participation, the most consistent evidence was observed for rejection of victim-blaming attitudes, while adjusted DiD analysis also showed higher odds of high caregiver self-efficacy. AIPW analysis additionally identified positive ATETs for recognition of SVAC forms and caregiver-child discussions on SVAC prevention, although these findings were not consistently observed across analytical approaches. However, the limited effects observed across other knowledge domains, reporting pathways, and parenting practices indicate that sustained implementation, stronger integration with formal child protection systems, and ongoing reinforcement are required to achieve broader behavioral change. Overall, this study adds to the growing evidence that caregiver-focused interventions are a promising component of comprehensive child protection strategies in LMICs and provides practical lessons for strengthening future SVAC prevention programmes in Tanzania and similar settings.

List of abbreviations

AIPW	Augmented Inverse Probability Weighting
AOR	Adjusted Odds Ratio
ATET	Average Treatment Effect on the Treated
CI	Confidence Interval
CSA	Child Sexual Abuse
DiD	Difference-in-Differences
ICRW	International Center for Research on Women
IRB	Institutional Review Board
LMICs	Low- and Middle-Income Countries
ODK	Open Data Kit
OR	Odds Ratio
SE	Standard Error
SVAC	Sexual Violence Against Children

WHO World Health Organization

Declarations

Clinical trial number: not applicable.

Ethics approval and consent to participate

Ethical approvals were obtained from the **Zanzibar Research Committee (IRB number 800200005403)** and administrative permission was obtained from the Office of the Second Vice President of the Revolutionary Government of Zanzibar (**Ref: CCA.33/411/01/).** All participants provided written informed consent before taking part in the study.

Consent for publication

Not applicable

Availability of data and materials

The datasets and materials used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contributions

JL, EJ, IM, SS, KH, and JH conceptualized and drafted the manuscript. JL reviewed and interpreted the analyses. EJ conducted the analyses and drafted the tables and figures. CB, KH, MB, and JK provided feedback and reviewed the manuscript. EJ oversaw programme implementation, data collection, and interpreted the findings. IM and JK secured funding, provided programme oversight, secured resources, and input on the drafts. All authors contributed to the final draft and approved its submission.

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