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Evaluation of the Impact and Effectiveness of the Contextual Reproductive Harmony Theory (CRHT) in Improving Access to and Use of Reproductive Health Services in the Districts of Lonkly and Atomey (Benin)

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Abstract

Introduction: Persistent gaps in reproductive health service utilization in sub-Saharan Africa are driven not only by structural barriers but also by deeply embedded socio-cultural resistance. The Contextual Reproductive Harmony Theory (CRHT) was developed to address these dynamics by promoting context-adapted, community-owned reproductive health interventions capable of disrupting the Inertial Resistance Cycle (IRC) that sustains behavioral inaction in marginalized settings. **Study Design:** A quasi-experimental pre-post control study was conducted from January to August 2022 in two villages of the Aplahoué commune, Couffo department, southern Benin. Lonkly village (Djikpamey district) served as the intervention site, while Atomey village served as the control. A purposive sample of 70 households (35 per village) with comparable baseline socio-demographic characteristics was selected. The intervention was delivered over eight months by trained community health workers and local leaders, using four CRHT operational tools: Social Harmony

Mapping (SHM), Harmonic Engagement Circles (HEC), a Ritual and Symbolic Approach (RSA), and a Digital Harmonization Platform (DHP). The same households were assessed at baseline and endline. Key indicators included knowledge, acceptance, and utilization of modern contraceptive methods, antenatal care attendance, spousal involvement, youth participation, and community stakeholder engagement. Data were analyzed using MedCalc software; statistical significance was set at $p < 0.05$. **Results:** Post-intervention, the CRHT group showed substantial improvements across all indicators compared to both its own baseline and the control group. Knowledge of modern contraceptive methods increased from 1.89% to 67.92% (vs. 13.21% in controls, $p < 0.0001$), while acceptance rose from 11.32% to 32.08% (vs. 15.09%, $p = 0.0403$). Utilization of maternal health services increased from 6.25% to 75.00% (vs. 37.50%, $p = 0.0353$). Regular antenatal consultations reached 69.23% (vs. 25.00%, $p = 0.0336$), spousal involvement rose to 50.94% (vs. 24.53%, $p = 0.0052$), and youth participation reached 80.56% (vs. 12.28%, $p < 0.0001$). The control group exhibited minimal or no improvement across all indicators. **Conclusion:** These findings suggest that CRHT may significantly enhance access to and utilization of reproductive health services in socio-culturally constrained settings. Larger randomized evaluations with extended follow-up are warranted to confirm effectiveness and guide scaling.

Keywords

Contextual Reproductive Harmony Theory, CRHT, Reproductive Health, Community-Based Intervention, Contraceptive Uptake, Socio-Cultural Barriers, Quasi-Experimental Study, West Africa Benin

1. Introduction

Over the past few decades, reproductive health has been recognized as a cornerstone of human development and global public health [1]. Despite substantial investments and concerted efforts by governments, international organizations, and non-state actors, significant disparities in access to and utilization of reproductive health services persist, particularly in low- and middle-income countries. Marginalized populations especially those residing in rural areas or embedded within rigid socio-cultural contexts continue to encounter multifaceted barriers that hinder both the uptake of modern contraceptive methods and the utilization of maternal health services [2] [3]. These barriers extend beyond economic constraints or insufficient health infrastructure, encompassing complex interplays of social norms, cultural beliefs, power dynamics, and deeply entrenched symbolic representations [4].

In Benin, the modern contraceptive prevalence rate stood at 15.5% in 2017-2018 according to the sixth Demographic and Health Survey (DHS-VI), while the maternal mortality ratio reached 391 per 100,000 live births (WHO, 2020). In the Couffo department, where the Aplahoué commune is located, these indicators are

even less favorable due to geographic isolation and the strong influence of restrictive socio-cultural norms. These local realities underscore the urgent need for innovative, context-grounded approaches to reproductive health promotion.

In this context, conventional reproductive health promotion strategies have demonstrated notable limitations [5] [6]. Rooted primarily in theoretical models derived from Western settings, these approaches often rest on oversimplified assumptions, such as a direct causal link between information access and behavioral change. Empirical evidence, however, indicates that even widespread information dissemination does not necessarily translate into actual adoption of reproductive health practices [5] [6]. These approaches frequently overlook the intricacies of local socio-cultural realities, leading to resistance, misinterpretation, and in some cases, active rejection of interventions. This misalignment between intervention design and contextual realities perpetuates a pronounced gap between the reproductive health needs articulated by communities and the services they ultimately utilize.

It is within this landscape of conventional intervention shortcomings that the Inertial Resistance Cycle (IRC) emerges as a pivotal conceptual framework for understanding reproductive health behaviors [7]. The IRC characterizes a dynamic, cyclical process in which recognition of reproductive health needs fails to translate into actionable behavior. Specifically, it identifies a "latent demand" among individuals such as the desire to space births [8] which coexists with cognitive awareness of contraceptive options but does not result in their actual adoption [7]. This inertia is reinforced by socio-cultural (norms, taboos, beliefs), psychological (fear, mistrust), and relational (partner influence, familial pressure) factors, culminating in strategic inaction despite the availability of adoption opportunities.

Moreover, the IRC highlights mechanisms that entrench the status quo, including the gradual normalization of adverse outcomes (unintended pregnancies, maternal complications) and post-hoc self-justifications, which together sustain the cycle of inaction. Consequently, limited adoption of reproductive health services should not be interpreted merely as a problem of access or knowledge; rather, it represents a manifestation of deeply embedded behavioral inertia rooted within social and cultural structures. By shifting analytical attention from individual determinants to systemic and contextual drivers, the IRC offers a robust framework for comprehensively understanding reproductive health behaviors (see conceptual framework of the IRC → **Figure 1**).

In response to these limitations and the complexity of observed dynamics, the Contextual Reproductive Harmony Theory (CRHT) was developed as an innovative theoretical framework aimed at rethinking reproductive health promotion strategies in marginalized contexts. The theory is grounded in a central premise: sustainable adoption of reproductive health innovations can only be achieved through their harmonious integration into existing socio-cultural systems. Unlike top-down approaches, CRHT emphasizes alignment, co-construc-

tion, and the gradual transformation of social norms, taking local specificities into account [7].

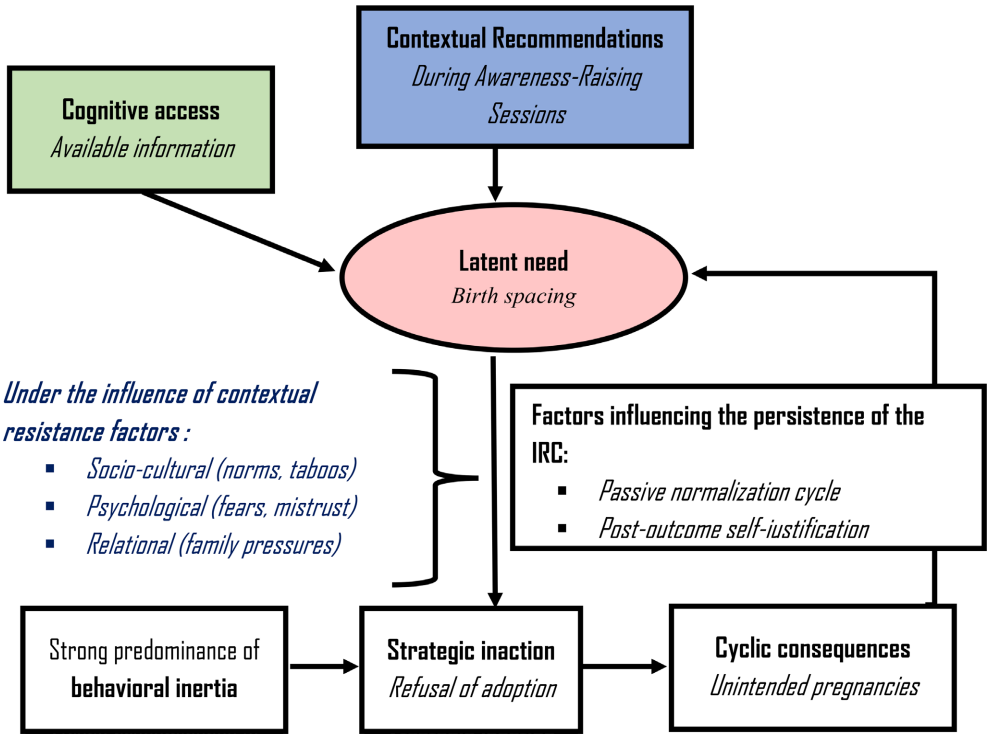

Figure 1. Theoretical framework of the inertial resistance cycle [7].

The development of CRHT stems from a critical evaluation of dominant models and a desire to overcome their limitations. It draws on an interdisciplinary synthesis of theoretical frameworks from social psychology, anthropology, sociology, and development studies. This theoretical hybridization enables the creation of an integrated model capable of addressing the complex challenges of reproductive health in contexts with strong socio-cultural resistance.

CRHT is structured around four complementary principles. Dynamic Contextual Adaptation (DCA) involves designing interventions tailored to local sociocultural realities [7]. Proactive Co-ownership (PCO) promotes active community engagement to enhance adherence and sustainability. Multilevel Harmonic Reinforcement (MHR) mobilizes stakeholders across all levels to generate a collective momentum for change [7]. Finally, Inclusive Resilience (IR) seeks to ensure the durability of interventions amid contextual constraints and evolving conditions.

Operationally, CRHT relies on several key tools: Social Harmony Mapping (SHM), which identifies cultural convergences and sources of resistance; Harmonic Engagement Circles (HEC), which facilitate community dialogue; the Ritual and Symbolic Approach (RSA), which promotes cultural acceptance; and the Digital Harmonization Platform (DHP), which improves information access and decision-making [7].

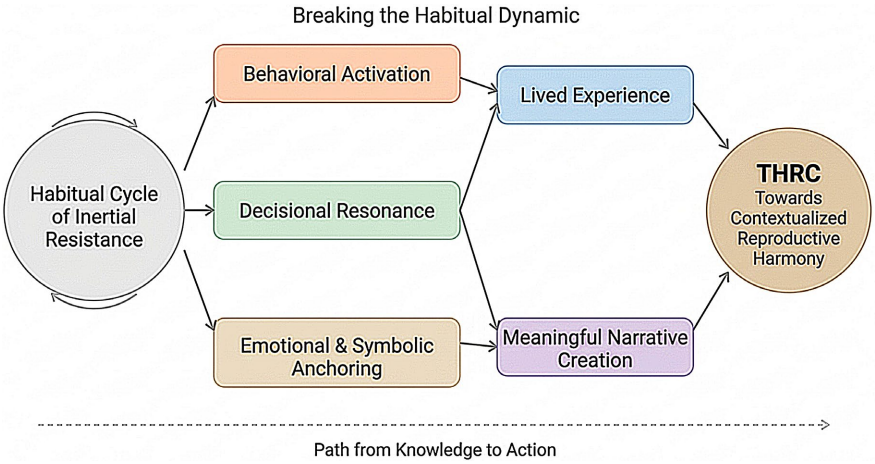

Figure 2. Operational pathway of the Contextual Reproductive Harmony Theory (CRHT): From the habitual cycle of inertial resistance to contextualized reproductive harmony.

In this context, it becomes essential to empirically assess the relevance and effectiveness of this theoretical framework in real-world intervention settings. The present study addresses this need and was conducted in the Lonkly and Atomey districts in southern Benin—areas characterized by socio-economic constraints and socio-cultural norms that strongly influence reproductive health behaviors.

The objective of this study is to evaluate the impact and effectiveness of CRHT implementation in improving access to and utilization of reproductive health services, as well as in transforming associated community behaviors and dynamics in marginalized contexts.

2. Study Setting, Materials, and Methods

The Lonkly and Atomey districts are located within the Aplahoué commune in southwestern Benin, in the Couffo department. This region features a sub-equatorial climate with two rainy and two dry seasons, favoring predominantly subsistence agriculture. Road infrastructure is often rudimentary, limiting access to basic services, including reproductive health care, for the local population. Socio-culturally, the communities of Lonkly and Atomey are primarily composed of ethnic groups such as the Adja and Fon, with deeply rooted traditional social structures. Cultural practices, religious beliefs, and social norms significantly influence reproductive health behaviors.

2.1. Study Area

The villages of Lonkly (Djikpamey district) and Atomey are located within the Aplahoué commune, Couffo department, in southwestern Benin. This region features a sub-equatorial climate with two rainy and two dry seasons, and an economy based predominantly on subsistence agriculture. Road infrastructure is often rudimentary, limiting access to basic services including reproductive health care for the local population. In Benin, the modern contraceptive prevalence rate stood at 15.5% in 2017-2018 according to the sixth Demographic and Health

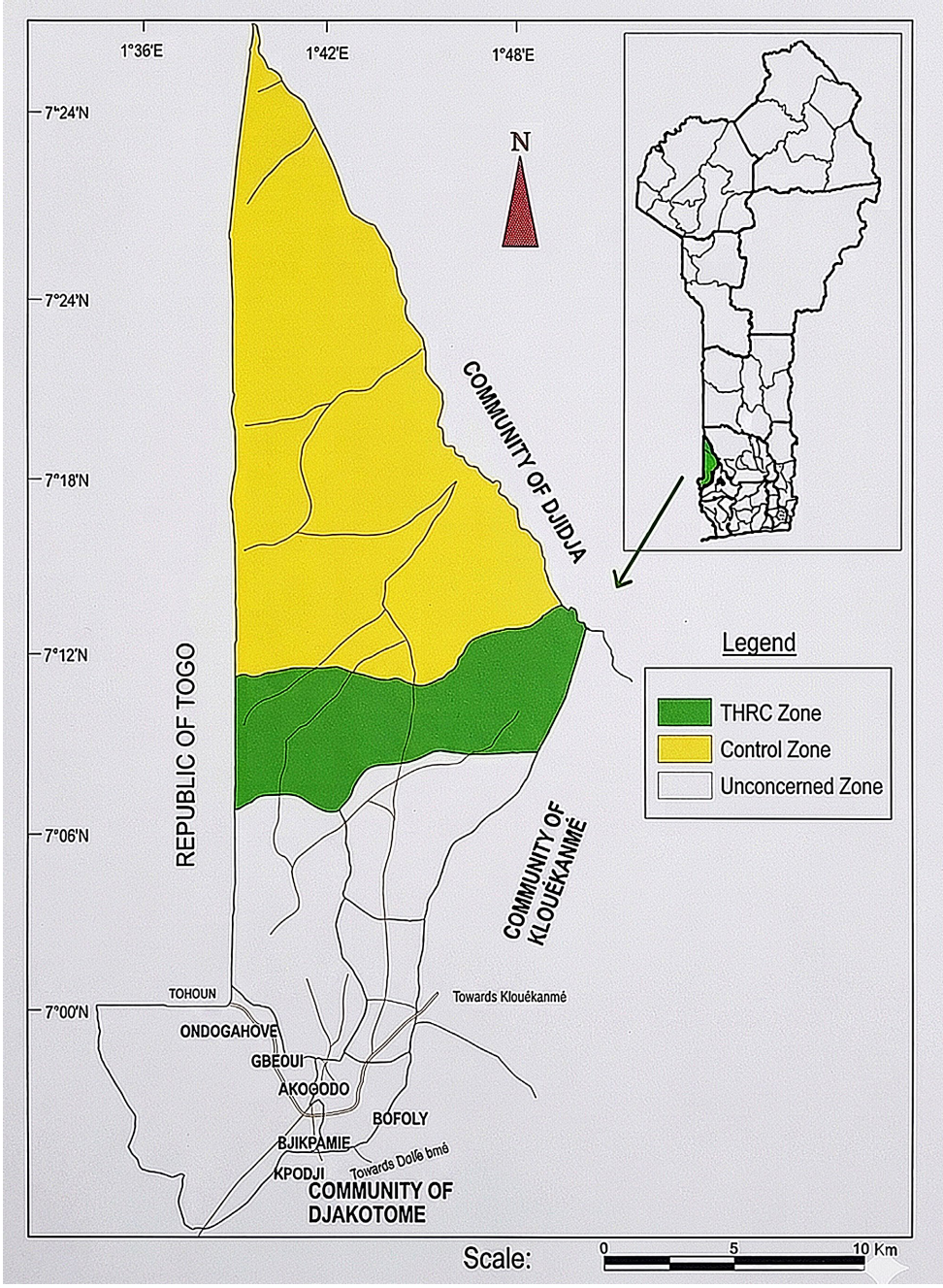

Figure 3. Map of the study area: THRC intervention and control zones in the Aplahoué Commune (Couffo Department, Southwestern Benin).

Survey (DHS-VI), while the maternal mortality ratio reached 391 per 100,000 live births (WHO, 2020). In the Couffo department specifically, these indicators are even less favorable due to geographic isolation and the strong influence of restrictive socio-cultural norms.

Socio-culturally, both communities are primarily composed of Adja and Fon ethnic groups, with deeply rooted traditional social structures in which cultural practices, religious beliefs, and social norms significantly shape reproductive

health behaviors. Women, in particular, face gender-related barriers that limit their access to education and health services. These characteristics are consistent with those documented in other regions of Benin and sub-Saharan Africa, where marginalized populations encounter comparable systemic obstacles in accessing health care and sexual and reproductive health information.

2.2. Study Design

This study was designed as a quasi-experimental pre-post control study, conducted from January to August 2022, to evaluate the impact and effectiveness of CRHT implementation in two villages of southern Benin. Lonkly (Djikpamey district, Aplahoué commune, Couffo department) served as the intervention site, while Atomey, another village within the same commune, served as the control group. Both villages were selected for their comparable socio-demographic characteristics, including population size, cultural practices, and levels of access to health services.

2.3. Sampling

A purposive sampling approach was used, selecting 35 households per village (n = 70 total). Inclusion criteria for the intervention group comprised households residing in the target village for at least one year, households with women of reproductive age, male partners, and community leaders involved in local decision-making. The control group followed the same inclusion criteria but received no CRHT-based intervention. Community stakeholders as defined by the CRHT framework, including community health workers, local authorities, leaders, and religious figures, were also included in the intervention group.

2.4. Intervention Description

The CRHT-based intervention was implemented in Lonkly village over eight months (January to August 2022). It was delivered by trained community health workers and local leaders who completed a five-day structured training session prior to the start of the program. The intervention package comprised four operational components derived from the CRHT framework.

The first component was Social Harmony Mapping (SHM), conducted during weeks 1 and 2 to identify cultural convergences, local resistance factors, and community entry points for dialogue around reproductive health. The second component consisted of Harmonic Engagement Circles (HEC), organized monthly over eight sessions, each lasting approximately 90 minutes, and targeting women of reproductive age, male partners, youth, and community stakeholders. The third component was a Ritual and Symbolic Approach (RSA), involving the co-design of communication materials integrating local symbols, proverbs, and cultural references to promote acceptance of reproductive health practices. The fourth component was a Digital Harmonization Platform (DHP), used to disseminate reproductive health audio messages via mobile phones in the local language (Adja-Gbe), improving access to information in a culturally adapted format.

No CRHT intervention was conducted in Atomey village. Both villages continued to receive standard government reproductive health services throughout the study period, ensuring that any observed differences could be attributed to the CRHT program rather than differential access to routine care.

2.5. Baseline Comparability

At baseline, both groups were assessed for socio-demographic homogeneity. Variables compared included mean age of women of reproductive age, household size, educational level, distance to the nearest health facility, and baseline reproductive health indicator scores. No statistically significant differences were found between the two groups at baseline ($p > 0.05$ for all comparisons), supporting the internal validity of post-intervention comparisons.

2.6. Data Collection

Data were collected by trained research assistants using a structured questionnaire pre-tested with 10 households in a neighboring village not included in the study, to ensure clarity and cultural appropriateness. The questionnaire was translated into Adja-Gbe and back-translated into French to ensure conceptual equivalence. The same 35 households per village were assessed at both baseline (January 2022) and endline (August 2022).

The following indicators were measured at both time points. Knowledge of modern contraceptive methods (MCM), expressed as a percentage, was assessed based on the proportion of participants demonstrating adequate understanding of at least 80% of evaluated concepts. Acceptance of MCM was measured based on participants' reported intention to use a contraceptive method within six months post-intervention if a need was perceived. Antenatal care (ANC) utilization was assessed by counting the number of consultations attended by pregnant women, with compliance defined as a minimum of four visits per the national standard. Male partner involvement in reproductive health decision-making was measured as the percentage of men actively participating in such decisions, with a satisfactory threshold set at 70% of predefined criteria. Maternal health service utilization was measured by the proportion of deliveries occurring in health facilities. Attitudinal change regarding family planning was evaluated on a validated 10-point scale, with scores above 7 indicating a positive shift. Youth participation was measured by the proportion of young people aged 15 to 24 engaged in awareness activities. Stakeholder knowledge among community health workers, leaders, village chiefs, religious leaders, and elders was assessed by comparing pre- and post-intervention scores.

2.7. Statistical Analysis

Descriptive statistics including frequencies and percentages were calculated for all indicators. Phase 1 comparisons (before vs. after CRHT within the intervention group) and Phase 2 comparisons (intervention group vs. control group at endline)

were conducted using either the chi-square test or Fisher's exact test, depending on expected cell frequencies. Effect sizes were estimated using Cramér's V for binary outcomes. Given the small purposive sample (n = 35 per group) and the multiple outcomes tested simultaneously, a Bonferroni correction was applied, setting the adjusted significance threshold at $p < 0.006$ (0.05 divided by 8 outcomes). All analyses were performed using MedCalc version 22.0 (MedCalc Software Ltd., Ostend, Belgium).

2.8. Ethical Considerations

All participants provided written informed consent prior to inclusion, having been informed of the study objectives, procedures, potential risks, and benefits. Participation was entirely voluntary, and participants were free to withdraw at any time without consequence. Measures were implemented to safeguard data confidentiality and participant anonymity throughout all phases of the study. Special attention was given to the equitable inclusion of all population groups, particularly women and other marginalized individuals. This study was conducted in full accordance with the ethical principles set forth in the Declaration of Helsinki.

3. Results

The intervention based on the Contextual Reproductive Harmony Theory (CRHT) significantly improved multiple reproductive health indicators in the experimental group compared to the control group. Knowledge of modern contraceptive methods (MCM) increased markedly from 1.89% to 67.92%, as did their acceptance (from 11.32% to 32.08%) and utilization of maternal health services (from 6.25% to 75.00%). Furthermore, regular antenatal consultations (69.23%), spousal involvement in reproductive health (50.94%), and youth participation in awareness activities (80.56%) also demonstrated significant increases. These findings underscore the effectiveness of CRHT in enhancing access, uptake, and community engagement in reproductive health services within marginalized areas.

Notably, stakeholder involvement in the control group did not differ significantly from the intervention group at endline ($p = 0.4585$), which may reflect pre-existing community engagement structures in Atomey village independent of the CRHT program.

4. Discussion

The results of this study can be interpreted in light of the Inertial Resistance Cycle (IRC), one of whose major contributions lies in explaining the sociocultural barriers to the adoption of contraceptive methods. The observed shift from very low levels of knowledge and adherence to markedly improved levels suggests that the CRHT intervention was able to partially disrupt the different phases of the IRC, notably initial distrust and passive indifference, thereby initiating a progressive engagement dynamic. These observations confirm that resistance is not solely due to an informational deficit but arises from a complex set of psychosocial and

Table 1. Effect of the Contextual Reproductive Harmony Theory (CRHT) on reproductive health indicators: Pre/post-intervention comparison (phase 1) and intervention vs. control village comparison (phase 2).

Effect indicators	Phase 1		p-value	Phase 2		p-value
	Before CRHT	After CRHT		Control group	Comparison village	
Knowledge rate of MCM	01.89	67.92	<0.0001	67.92	13.21	<0.0001
Acceptance of MCM	11.32	32.08	0.0099	32.08	15.09	0.0403
Regular ANC (at least 4 visits)	16.67	69.23	0.0109	69.23	25.00	0.0336
Spousal involvement in RH	30.19	50.94	0.0304	50.94	24.53	0.0052
Utilization rate of MHS	06.25	75.00	0.0001	75.00	37.50	0.0353
Changes in FP attitudes	01.89	37.74	<0.0001	37.74	15.09	0.0085
Youth participation	17.72	80.56	<0.0001	80.56	12.28	<0.0001
Stakeholder involvement	15.79	52.63	0.0182	52.63	40.91	0.4585

community factors.

The literature supports this interpretation. According to Boke *et al.* [9], barriers to contraceptive adoption in Ethiopia are strongly influenced by social and cultural beliefs, including fears of infertility and pressures from traditional norms. Similarly, Allotey and Bosoka [10] demonstrated that contraceptive acceptance in Ghana largely depends on the influence of community and religious leaders. In this context, the outcomes observed in our study, notably increased spousal involvement and enhanced youth participation, suggest that CRHT effectively mobilized these social levers, consistent with its principles of co-ownership and multi-level mobilization.

Moreover, the simultaneous improvement in knowledge, attitudes, and practices observed in this study reinforces the notion that approaches combining education and community engagement are the most effective. Moucheraud *et al.* [11] demonstrated that the impact of contraceptive services is maximized when interventions integrate both an educational dimension and active community involvement. Likewise, the work of Osborne *et al.* [12]-[14] highlights that the absence of sociocultural mediation constitutes a major determinant of inequities in contraceptive use in Sierra Leone. By incorporating tools such as community mediation, engagement of local leaders, and participatory strategies, CRHT appears to directly address these structural gaps.

The results of this study also provide critical insight into the limitations of classical behavior change models. While such models assume that increased access to information is sufficient to alter practices, empirical data suggest otherwise. Silverman *et al.* [15] notably highlighted the lack of correlation between access to information and effective contraceptive use among married adolescents in Niger. In contrast, the outcomes of our study suggest that the CRHT approach, by integrating the social, cultural, and relational dimensions of behavior, can overcome this limitation by translating information into genuine engagement.

This effectiveness can be attributed to the systemic and adaptive nature of CRHT. By considering local specificities and fostering community ownership, this approach aligns with a logic of sustainable transformation of social norms. The findings of Gebrerufael and Hagos [16], which demonstrated the effectiveness of interventions adapted to nomadic populations in Ethiopia, support the idea that contextualization is a key determinant of intervention success.

However, despite these promising results, several challenges must be considered when contemplating broader implementation of CRHT. Deploying this approach requires substantial financial and technical resources, particularly for training community actors and deploying innovative tools such as the Digital Harmonization Platform [17]-[19]. In contexts characterized by chronic underfunding of health systems, as highlighted by several studies [19], these requirements may pose barriers to scaling up.

Furthermore, institutional acceptability of CRHT represents a major challenge. Policymakers often favor standardized approaches that are easier to integrate into public policy, at the expense of contextualized models requiring continuous adaptation. On the sociocultural level, despite observed progress, resistance linked to religious and patriarchal norms persists, as noted by Allotey and Bosoka [10], and may limit long-term impact if not sustainably addressed.

Finally, the question of sustainability remains central. Although this study demonstrated short-term effectiveness, the durability of behavioral changes will depend on institutionalization of the approach and its integration into existing health systems. Moucheraud *et al.* [11] emphasize the importance of monitoring mechanisms and sustainable funding to ensure the continuity of family planning interventions.

Overall, the findings of this study empirically validate the relevance and effectiveness of CRHT as an innovative model for promoting reproductive health. By simultaneously addressing cognitive, social, and structural dimensions of behavior, this approach offers a credible alternative to classical models, particularly in contexts with strong sociocultural constraints.

5. Limitations

Several limitations of this study must be acknowledged. First, the purposive sampling of 35 households per village limits the statistical power and generalizability of findings; results should be interpreted as exploratory rather than confirmatory. Second, the quasi-experimental design, while appropriate for the field context, does not allow for full control of confounding variables or definitive causal inference. Third, all outcome measures relied on self-reported data, which may be subject to social desirability bias, particularly for stigmatized topics such as contraceptive use. Fourth, the relatively short follow-up period (8 months) does not allow assessment of the durability of behavioral changes beyond the intervention period. Fifth, the Digital Harmonization Platform (DHP) component assumes mobile phone access, which may not be uniformly available across similar communities. These limitations suggest caution in extrapolating findings to other settings and underscore the need for

larger, randomized evaluations of the CRHT framework.

6. Conclusion

This study provides preliminary evidence that the Contextual Reproductive Harmony Theory (CRHT) may represent a meaningful advance in reproductive health promotion by addressing the sociocultural and structural determinants of contraceptive inertia. The observed improvements across multiple indicators including knowledge, acceptance, ANC attendance, and community engagement suggest that context-adapted, community-owned approaches can partially overcome the barriers described by the Inertial Resistance Cycle. However, given the small purposive sample, quasi-experimental design, and short follow-up, these results should be interpreted cautiously. Scaled, randomized evaluations with longer follow-up are needed to confirm effectiveness, assess cost-efficiency, and guide institutionalization. Subject to those confirmations, CRHT offers a credible and replicable framework for reproductive health programming in socio-culturally constrained settings across West Africa and beyond.

Ethics Statement

Informed consent was obtained from all participants prior to data collection. Confidentiality, anonymity, and the right of participants to withdraw from the study were strictly respected.

Author Contributions

All authors contributed to the study conception and design, data collection and analysis, and manuscript drafting. All authors approved the final version submitted for publication.

Data Availability Statement

The data collected during this study are confidential and cannot be publicly shared due to the sensitive nature of the information.

Consent for Publication

All participants provided informed consent for the publication of anonymized data derived from their interviews.

Compliance with Ethical Standards

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki and adhered to established standards of good scientific practice in qualitative research.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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