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AN INTEGRATED EMPOWERMENT MODEL OF SPIRITUAL PRAYER FOR ORAL HEALTH OF PREGNANT WOMEN

DESI ANDRIYANI
DEPARTMENT OF DENTAL HEALT, POLITEKNIK KESEHATAN TANJUNG KARANG, BANDAR LAMPUNG, INDONESIA

AFIF ANSHORI
FACULTY OF DA'WAH AND COMMUNICATION SCIENCE, UNIVERSITAS ISLAM NEGERI RADEN INTAN LAMPUNG, BANDAR LAMPUNG, INDONESIA

HENI NOVIARITA
FACULTY OF DA'WAH AND COMMUNICATION SCIENCE, UNIVERSITAS ISLAM NEGERI RADEN INTAN LAMPUNG, BANDAR LAMPUNG, INDONESIA

RINI SETIAWATI
FACULTY OF DA'WAH AND COMMUNICATION SCIENCE, UNIVERSITAS ISLAM NEGERI RADEN INTAN LAMPUNG, BANDAR LAMPUNG, INDONESIA

Abstract The purpose of this study was to construct and test an integrative model that provides human-oriented social work services to improve the oral health of pregnant women by verifying the combined effects of multidimensional empowerment educational, social, spiritual, and structural on the oral health outcomes of pregnant women and the moderating effect of HST. Recognizing the limitations of traditional biomedical approaches, this study attempts to adopt a holistic framework that considers both individual agents and structural contexts. A cross-sectional analysis was conducted on pregnant women in developing countries using structured questionnaires to assess constructs in empowerment, trust, and oral health outcomes. Results showed a significant positive predictive effect of all four dimensions of empowerment on improved oral health in pregnant women. Notably, trust in the health system significantly moderated the relationship between each type of empowerment and oral health outcomes. The novelty of this study lies in the importance of integrating theoretical references that include spiritual empowerment alongside traditional dimensions, while explicitly testing the catalytic effect of institutional trust. Effective public health responses must be holistic, not fragmented. Programs must work on multiple levels to achieve sustainable outcomes, especially in religious and developing country contexts. This means empowering individuals while also building trust in the healthcare system. This will help maximize the benefits of health interventions for pregnant women in terms of safety and health.
Keywords: Maternal oral health, Health empowerment, Spiritual empowerment, Health system trust, Holistic health model

INTRODUCTION:

A major global public health problem is maternal oral health, which is a serious concern during pregnancy because of the potential consequences for oral disease. A review of the latest epidemiological findings reveals that 60-75% of pregnant women experience oral health problems, with this figure being particularly high in developing countries (Frencken et al., 2017; World Health Organization, 2022). The inverse relationship between periodontal disease and adverse pregnancy outcomes (APO) requires predictive consideration, since untreated oral pathological conditions are associated with preterm birth and low birth weight (Bobetsis et al., 2020; Hepburn, 2008). Furthermore, emerging evidence suggests that pregnancy-related hormonal changes may exacerbate their oral vulnerability, rendering them susceptible to irreversible damage (Kumar et al., 2022; Mihalas et al., 2017; Silva de Araujo Figueiredo et al., 2017). Suboptimal utilisation of maternal dental care, even in low-resource settings (Elmusharaf et al., 2015; Hofmeyr et al., 2009; Williams et al., 2025), underscores the need for innovative solutions to address underlying systemic health service challenges.
Contemporary health models acknowledge that traditional dental therapy alone is insufficient. The want for models that give people more power has been suggested as a way to make lasting changes to health behaviour (Elder et al., 1999; Piracha et al., 2024). The focus on maternal OHP from a biological and oral health (medical) perspective, in modern times, shows the lack of attention to the psychosocial and spiritual parts, even though there is proof that they are important in health decision making processes (Collins et al., 2021; Leigh,

2019). These challenges are exacerbated by differences in digital health literacy, which prevent access to information for pregnant individuals (Kim et al., 2025; Timsin & Wangpitipanit, 2025). During the course of the pandemic, further emphasis has been placed on these disparities, with vulnerable health systems in developing areas being exposed (Dagovetz et al., 2025; Gobburi et al., 2025; Li et al., 2025).

A theoretical model combining three related and complementary theories has been developed. Firstly, the Health Empowerment Theory, which focuses on knowledge and self efficacy (Shearer, 2009; Wallerstein, 1993). Secondly, the Social Ecological Model, which considers multi-level factors (Kwan et al., 2021). And thirdly, the Spiritual Health Framework, which learns from religious coping strategies (Abdullah et al., 2021). Together, these theories provide a framework through which maternal oral health behaviour can be understood and changed. By incorporating educational, social, spiritual, and structural levels of influence, the approach is comprehensive, moving beyond traditional biomedical models to address both immediate needs and sustained behaviour change (Agudelo-Hernández et al., 2025; Pienaah et al., 2026).

The urgency of the research stems from divergent findings across cultural contexts. Educational empowerment has been shown to have a positive effect in Western contexts (Hutchinson & O'Leary, 2016; Kachoria et al., 2022; Shah & Khurshid, 2019; Zafar & Abu-Hussin, 2025), but the results of studies conducted in Muslim-majority countries are more varied, suggesting that cultural differences may play a role. Structural interventions appear to be highly effective in developed settings (Kludacz-Alessandri et al., 2025), but have no impact in developing settings, suggesting moderation by the healthcare system. The outcomes of spiritual factors are particularly varied. For instance, research indicates that prayer is more effective in religious communities than in secular ones (Koussens, 2023; Rothschild et al., 2009). These differences highlight the importance of culture and systems in this area and clearly demonstrate the need for context-specific models. Adding Sharia elements to healthcare delivery offers a new way to make interventions more acceptable to Muslim populations and fills an important gap in the current literature (Hossain et al., 2025; Islam et al., 2021; Piracha et al., 2024).

The objective of this study is to develop and validate an integrated spiritual empowerment model that can enhance maternal outcomes through oral health-promoting interventions in developing countries. The present study sets out to explore the interactions between various dimensions of empowerment, namely educational, social, spiritual and structural. The study will also consider the moderating role of trust in health systems. The results of the present study are to be used for two principal objectives. Firstly, they will inform the development of evidence-based program for healthcare providers. Secondly, they will facilitate further theoretical expansion of maternal health empowerment in the area of maternal oral health among religious communities, with the ultimate goal of implementing global initiatives in this field. In this context, spiritual inclusion has been hypothesis to increase the effectiveness and sustainability of the interventions concerned.

LITERRATURE REVIEW AND HYPOTHESES DEVELOPMENT

Educational empowerment on maternal oral health outcomes

Educational empowerment is a core process that enhances maternal oral health knowledge and self-efficacy as a precursor to actual OHB practices. The theoretical, model is based on Bandura's social cognitive theory, discussing the process of knowledge translation and skills rehearsal leading to enhanced perceptions of effective abilities for performing oral self-care behaviors (Chen et al., 2015; Ghoreishi et al., 2019). There is evidence that individualized antenatal oral health education has a substantial and beneficial impact on increasing the level of OHL and bringing about crucial behavioral changes during pregnancy (Kamolchaiwanich et al., 2025; Vamos et al., 2015). The effect is then exacerbated in digital health literacy where people can access credible information and support systems (Palumbo et al., 2021; Sørensen, 2024). Individualised educational interventions involving pregnancy oriented oral health issues were particularly effective in increasing preventive behaviour and seeking dental care (Ghaffari et al., 2018; Vamos et al., 2019). Together, these observations corroborate the postulate that educational empowerment will have a positive influence on maternal oral health by various complex pathways. Hypothesis 1: Educational empowerment positively affects maternal oral health outcomes

Social empowerment on maternal oral health outcomes

objective of enhancing maternal oral health. This is achieved by the creation of supportive environments and the strengthening of positive health practices. In keeping with the Social Ecology Model, this approach states that a person's health behaviour is largely influenced by social networks and community organisations (Grzywacz & Fuqua, 2000; Walker & Brömmelstroet, 2025). Peer support groups facilitate the dissemination of information on an emotional and practical level, thereby contributing to the removal of barriers to access and the demystification of oral health priorities in pregnancy (Ahmed et al., 2025; Wilson et al., 2025). The involvement of family members, particularly that of spouses, has been demonstrated to positively influence the household environment, fostering practices that promote oral health and facilitate access to dental services (Pabbla et al., 2025). CHWs act as a conduit between formal healthcare systems and local communities, offering culturally sensitive counsel and sustaining engagement through continuous follow-up (Beggs et al., 2025). These interconnected social pathways, when considered as a whole, are shown to have a cumulative effect on self-efficacy, leading to a reduction in structural barriers and the maintenance of oral health behaviours that contribute to positive oral health outcomes for mothers, alongside the experience of

felt empowerment effects. Hypothesis 2: Social empowerment positively affects maternal oral health outcomes.

Spiritual empowerment on maternal oral health outcomes

Tools that have been validated have produced results that support an association between spirituality and oral health (Folorunsho et al., 2025; Novrinda et al., 2025). Indeed, it has been found that emotional balance and commitment to self-care are promoted by faith-based messages and prayer-based stress management, as validated by the Religious Health Messages Acceptability Scale (RHMAS) and the Spiritual Coping Scale (SCS) (Ejem et al., 2025; Hassan & Doğan, 2025). Additionally, the Maternal Values Affirmation Exercise (MVAE) suggests that internalised spiritual values can boost motivation for oral hygiene habits (Harvey & Wallace, 2025). In general, these scientific tools show that spiritual empowerment can improve mental and emotional well-being, leading to higher levels of OHL, better dental care and better maternal health. Hypothesis 3: Spiritual empowerment positively affects maternal oral health outcomes.

Structural empowerment on maternal oral health outcomes

Empirical data from standardized scales supports the strong impact of structural empowerment on maternal oral health (Jia et al., 2025; Martínez et al., 2025). There is evidence from the Maternal Health Referral System Quality (MHRSQ) and Perceived Access to Maternal Dental Care (PAMDC) scales that integrated referral systems and enhancing service accessibility have a positive effect on having consistent dental visits during pregnancy (Rahimi et al., 2025; Tsai et al., 2025). Moreover, results from the Maternal Dental Insurance Coverage Scale (MDICS) reveal that having sufficient dental insurance coverage significantly decreases financial barriers to encourage early access to care seeking behaviors (Ćwirynkało et al., 2025; Jing et al., 2025). Together, these endpoints demonstrate that structural empowerment leads to equitable utilization and durable outcomes in maternal oral health. Hypothesis 4: Structural empowerment positively affects maternal oral health outcomes

Moderating role of health system trust

Interventions that improve maternal oral health outcomes are more likely to be successful if they are based on empowering people if there is already a high level of trust in the health system (Arefi et al., 2020; Patrick et al., 2006). According to Institutional trust theory, women who trust their healthcare system are more likely to internalise educational messages and adopt behaviour recommended by professionals (Marshall et al., 2026). Adherence to preventive oral care behaviours and heightened involvement in antenatal OH programmes is linked with trust in maternity care providers, according to the findings of the Trust in Maternity Care Providers Scale (TMCPS) (Griffith et al., 2025). Similarly, the Health System Fairness Scale-Pregnancy (HSFS-P) shows that perceptions of fairness encourage participation in empowering activities, helping mothers to maintain oral health behaviours despite systemic barriers (Olarewaju & Tundealao, 2025). In summation, trust functions as a psychological catalyst that amplifies the impact of educational, social and spiritual empowerment programmes on both acceptance and behavioural outcomes.

Additionally, trust in the health system improves the effectiveness of structural empowerment strategies by fostering confidence in institutional processes and improving access to care. Research using the Medical Advice Adherence Scale-Pregnancy (MAAS-P) shows that intentions increase when maternal care systems are seen to be competent, transparent, and responsive (Wolf et al., 2025). Integrated referral services, health insurance and community care systems are all encouraged by this trust (Rahimi et al., 2025; Ćwirynkało et al., 2025). In environments with high institutional trust, pregnant women are more likely to develop a partnership-based engagement with healthcare providers, transferring empowerment interventions into oral health outcomes. Therefore, the trust in the health system has a dual role: it both moderates and mediates, thereby facilitating the synergistic effect of the dimensions of empowerment. As a result, it is established as an essential factor in the implementation of interventions to improve maternal oral health. Hypothesis 5: Health system trust strengthens the effect of educational empowerment on maternal oral health outcomes. Hypothesis 6: Health system trust strengthens the effect of social empowerment on maternal oral health outcomes. Hypothesis 7: Health system trust strengthens the effect of spiritual empowerment on maternal oral health outcomes. Hypothesis 8: Health system trust strengthens the effect of structural empowerment on maternal oral health outcomes.

Hypothesis development model framework

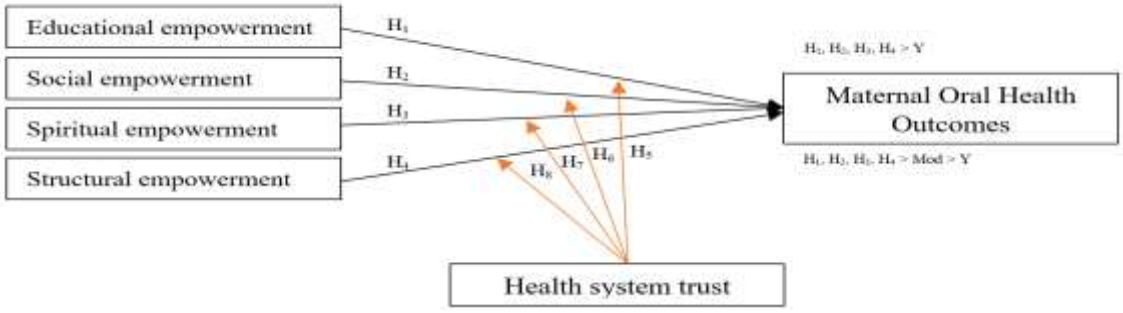

FIGURE 1 Integrated spiritual empowerment model for maternal oral health

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METHODOLOGICAL APPROACH AND STUDY DESIGN

Research Design

The integrated empowerment model is analysed using moderated regression analyses in IBM SPSS Statistics 28, and the text employs a cross-sectional quantitative design. The moderation and indirect effects are tested based on (Baron, Reuben M. Kenny, 1986) analytical framework, supplemented by the PROCESS macro v4.0 (Hayes, 2022) to analyse the moderating effect of health system trust on the relationship between empowerment dimensions and maternal oral health outcomes (Farid I, Suhartini R, 2024; Wesprimawati Farid et al., 2024). This approach aligns with health services research, which involves rigorous testing of complex real-world theory while adhering to high statistical validity and reliability standards (Linda Utami & Yudita Melia, 2024). Ethical approval for this study was received from the institutional review board, ensuring the confidentiality, informed consent and voluntary participation of all individuals at all stages of data collection and analysis (Zelna & Nurhidayah, 2024).

Sampling frame and the observation of study population

The total sample in this study consisted of 200 pregnant women who came to the Kedaton Public Health Center Bandar Lampung, Indonesia for antenatal treatment. All participants were eligible, including matters to be met: gestational age 8-32 weeks; resident in the working area Kedaton; and willing participated. The sample size was established in accordance with (Salimon et al., 2021) table at a margin of error of 5% and a confidence level of 95%. Participants were proportionally recruited from seven sub-district service areas to ensure representativeness and statistical power for the analysis of empowerment and maternal oral health (Dovach et al., 2025; Tianastia Rullyni et al., 2025). Table 1 Distribution of respondents spread proportionally according to population size of each service area. This balanced selection also corresponds to similar sampling methods used in maternal oral health research (Izati & Zhafira, 2024; Virtanen et al., 2015), and provides coverage of demographic and educational differences among pregnant women.

TABLE 1 Sample distribution of pregnant women in service areas

SERVICE AREA	POPULATION	SAMPLE SIZE (N)	PERCENTAGE (%)
KEDATON	14,259	52	26.00%
SIDODADI	12,251	42	21.00%
SURABAYA	12,392	41	20.50%
SUKAMENANTI	3,829	14	7.00%
SUKAMENANTI BARU	4,341	15	7.50%
PENENGAHAN	3,685	18	9.00%
PENENGAHAN RAYA	4,696	18	9.00%
TOTAL	55,453	200	100.00%

Author 2025

A balanced demographic distribution is shown by the table, with the majority of respondents having been educated at the high school (45.5%) and diploma (34%) levels. The generalizability of the empowerment model is enhanced by the inclusion of participants from multiple educational strata. The age range (18–42 years) represents the typical reproductive span and aligns with antenatal demographic profiles found in Southeast Asian maternal health research.

TABLE 2 Sample Characteristics Summary

CHARACTERISTIC	CATEGORY	FREQUENCY (N)	PERCENTAGE (%)
AGE (YEARS)	18–24	52	26.00%
	25–31	61	30.50%
	32–38	57	28.50%
	39–42	30	15.00%
EDUCATION LEVEL	HIGH SCHOOL	91	45.50%
	DIPLOMA	68	34.00%
	BACHELOR	28	14.00%
	MASTER	13	6.50%

Author 2025

Measurement instruments for pregnant women's oral health study

Measurements of empowerment and maternal oral health outcomes were comprehensively achieved using validated tools. Educational empowerment was assessed using validated scales, including the MOHKQ (Boggess et al., 2011), the MOC-SES (Wretman et al., 2020) and the eHEALS (Paige et al., 2017), which reflect literacy and self-care abilities. The factors that empower people socially and spiritually were assessed using indicators that are appropriate to the context and which explore the roles of peers, family and religion (Ejem et al., 2025; Tsai et al., 2025). Trust and structural empowerment constructs, adapted from newer maternal health models ((Griffith et al., 2025; Rahimi et al., 2025), measured access and perceived justice. Another option was to use objective and subjective clinical and behavioural indicators Kamolchaiwanich et al. (2025), Silness & Löe, (1966), to assess oral health abutments and self-care. These indicators have strong psychometric reliability and contextual validity. The variable data in Appendix A or Table 3 presents the statement instrument data for each indicator in each source.

Analytical strategy and statistical modeling

The analyses were performed using IBM SPSS. The PROCESS v4 Hayes 0 macro was used to analyse the relationships between the dimensions of the empowerment pathway (Plumlee et al., 2015). These dimensions are education, social, spiritual and structure. The analyses also examined maternal oral health outcome. The analyses looked at the moderating effect of Health System Trust (HST). Preliminary analyses involved checking for missing values and outliers, and assessing normality. Cronbach's alpha was used to calculate the reliability, and composite scores were generated. Before hypothesis testing, information about the data and how things are connected was shown. Moderation testing was conducted using hierarchical regression. It also used PROCESS macro (Model 1). This was with 5,000 bootstrap samples. It had bias-corrected 95% confidence intervals. The model assumptions of multicollinearity, homoscedasticity and linearity were validated. The regression outputs included unstandardised and standardised coefficients, standard errors, t-values, significance levels, and R^2 change. This way of thinking is similar to the ways researchers have done similar studies in the past (Ghaffari et al., 2018).

RESEARCH FINDINGS AND ANALYSIS

Oral Health Indicators and Maternal Empowerment

The mean scores for the dimensions of maternal empowerment were generally high among the participants, suggesting that pregnant women have a positive perception of empowerment. The highest mean score was for structural empowerment (M = 3.91, SD = 0.70), followed by educational empowerment (M = 3.89, SD = 0.68), with social empowerment scoring the lowest (M = 3.75, SD = 0.73). A high level of confidence in healthcare providers/systems was also reflected in health system trust (M = 3.77, SD = 0.66). Self-care oral behaviour scored highest among oral health outcomes (M = 3.90, SD = 0.68), indicating a relatively high level of commitment to oral hygiene practices. In contrast, utilisation of dental care services was comparatively lower (M = 3.76, SD = 0.71). The maternal oral health outcome index (M = 3.88, SD = 0.72) and the plaque index (M = 3.80, SD = 0.66) indicate that the sample's oral health status is acceptable or satisfactory, which is consistent with previous maternal health research pointing to a link between empowerment and preventive oral behaviour.

TABLE 4 A summary of the demographic and health variable

Variable	Mean	SD	Min	Max
Educational Empowerment	3.89	0.68	2.1	5
Social Empowerment	3.75	0.73	1.95	5
Spiritual Empowerment	3.82	0.64	2.2	5
Structural Empowerment	3.91	0.7	2.15	5
Health System Trust	3.77	0.66	2	5
Maternal Oral Health Outcomes	3.88	0.72	2.1	5
Oral Health Knowledge	3.84	0.7	2	5
Self-Care Oral Behavior	3.9	0.68	2.15	5
Utilization of Dental Care Services	3.76	0.71	2.05	5
Plaque Index (reverse-scored, higher = cleaner)	3.8	0.66	2	5

Author 2025

Construct Intercorrelation of Maternal Health

The Pearson correlation coefficients between the main constructs of the study are presented in Table 4. The close interrelatedness of the empowerment dimensions, health system trust and maternal oral health outcomes was highlighted by the significant positive correlations found between all pairs of variables tested. The strongest link was found to be between educational empowerment (EE) and maternal oral health outcomes (MOHO), at .59 with a p-value of less than .01. This suggests that improving educational empowerment is associated with better oral health. The findings revealed strong correlations between HST and both

StE (r = .53, p < .01) and MOHO (r = .60, p < .01). These results emphasise the importance of institutional and systemic factors in achieving better health outcomes. The validity of the conceptual model is further substantiated by significant positive associations across all constructs. These demonstrate that empowerment and trust are interrelated factors in improving oral health among mothers.

TABLE 5 Correlation Matrix of Study Constructs

Variable	EE	SE	SpE	StE	HST	MOHO
EE	1					
SE	.56**	1				
SpE	.48**	.52**	1			
StE	.54**	.57**	.46**	1		
HST	.49**	.51**	.45**	.53**	1	
MOHO	.59**	.57**	.54**	.60**	.58**	1

Author 2025

Oral Health Predictive Effects of Empowerment

The results of the tests that looked at the four parts of empowerment and how they affect mummies' oral health are in Table 6. These showed significant positive predictions for oral health for all empowerment dimensions (p <.01), thus supporting H1–H4. Educational empowerment (EE; β = 0.34, t = 543, p <.001) and structural empowerment (StE; β = 0.36, t = 5.71, p <.001) were found to be the most important predictors, suggesting that what mothers know and support from institutions are key to better oral health. Social empowerment (SE; β = .28, t = 4.12, p <.001; see Table 1) had the strongest positive associations with spiritual identity/other verb and spiritual empowerment (PsE; β = .23, t = 3.03, p <. The interpersonal and spirituality dimensions also revealed significant positive relationships with oral health outcomes (p <.01). The adjusted R^2 values (0.35–0.44) demonstrate that the empowerment constructs collectively account for a significant proportion of the variability in maternal oral health.

TABLE 6 Regression of Empowerment Dimensions on Oral Health Outcomes

Predictor	B	SE	β	t	p	95% CI	Adj. R^2
C	0.92	0.25	—	3.68	0.000	(0.42, 1.42)	
EE	0.38	0.07	0.34	5.43	0.000	(0.24, 0.52)	0.35
SE	0.31	0.08	0.28	4.12	0.000	(0.16, 0.46)	0.41
SpE	0.27	0.09	0.23	3.03	0.003	(0.09, 0.45)	0.38
StE	0.4	0.07	0.36	5.71	0.000	(0.26, 0.54)	0.44

Author 2025

Moderation Models

To ensure the robustness and consistency of the findings, we applied two complementary analytical approaches to examine whether HST moderated the relationships between the four empowerment dimensions and maternal oral health outcomes (H_5–H_8). The aim was to minimise multicollinearity. This was achieved by conducting a hierarchical regression analysis with the mean-centered variables. In the first step, the predictors (empowerment dimensions) were entered. In the second step, the HST was entered as a moderator. In the third step, the interaction term (*Predictor_c* × *HST_c*) was entered. The interaction effect was tested using an incremental variance (ΔR^2) approach. Secondly, the statistical significance of the moderation effects was modelled, with bias-corrected 95% confidence intervals, using the Hayes' PROCESS macro (Model 1 with 5,000 bootstraps). Simple slope analyses were performed at ± 1 SD levels of HST. This was a moderator. These analyses were used to further clarify the conditional effects. These effects show how maternal oral health outcomes can vary. This variation can occur at different levels of health system trust.

Moderating Role of System Trust on Health System-Educational Empowerment

The moderating effect of Health System Trust (HST) on the relationship between Educational Empowerment (EE) and Maternal Oral Health Outcomes (MOHO) Model 1: EE was a statistically significant predictor of MOHO (β = 0.34, t = 5.43, p <. 001). In Model 2, the addition of HST (ΔR^2 = 0.04) significantly improved the model, and HST had a significant positive effect (β = 0.26,t = 3.62,p <. 001). Model 3: The interaction term (EE_c × HST_c) was significant (β = 0.10, t = 2.18, p =. 031), meaning that HST reinforced the positive impact of educational empowerment on oral health. Such ΔR^2 of 0.02 indicates a small yet significant moderating effect, thereby supporting H5, and indicates that the effect of maternal education empowerment on oral health is greater for those mothers with higher trust in the health system.

TABLE 7Trust influences Treatment on Educational Power

Model	Predictor	B	SE	β	t	p	ΔR^2
Model 1	EE_c	0.38	0.07	0.34	5.43	0	—
Model 2	HST_c	0.29	0.08	0.26	3.62	0	0.04

Model 3	EE_c × HST_c	0.11	0.05	0.1	2.18	0.031	0.02

Author 2025

Moderating Effect of Health System Trust on Social Empowerment

The moderating analysis of HST on SE-MOHO relationships is shown in Table 8. In Model 1, MOHO was predicted significantly by SE (β = 0.28, t = 4.12, p <.001). In the second step, HST was entered as a robust positive predictor. The value for this was β = 0.22, t = 3.46, p =. 004. This improved model fit. The value for this was $\Delta R^2 = 0.03$. In Model 3, the interaction term (SE_c × HST_c) was entered (β = 0.09, t = 2.01, p = 0.045), suggesting a moderating effect of HST on the relationship between SE and MOHO. This indicates that the positive impact of social empowerment on maternal oral health is more significant when trust in the health system is higher. The incremental variance explained was small ($\Delta R^2 = 0.01$). This result supports H6. H6 suggests that the interaction of interpersonal empowerment and institutional trust may facilitate the effect between the mothers and their health behaviours and outcomes.

TABLE 8Trust and Moderate on Social Empowerment

Model	Predictor	B	SE	β	t	p	ΔR^2
Model 1	SE_c	0.31	0.08	0.28	4.12	0	—
Model 2	HST_c	0.25	0.07	0.22	3.46	0.001	0.03
Model 3	SE_c × HST_c	0.09	0.04	0.09	2.01	0.045	0.01

Author 2025

The Moderating Role of Health System Trust on Spiritual Empowerment

A moderation analysis was performed to investigate the role of Health System Trust (HST) as a mediator between Spiritual Empowerment (SpE) and Maternal Oral Health Outcomes (MOHO). In Model 1, betas and standardised betas for Scandalous Rapture were significant predictors of MOHO (β = 0.23, t = 3.03, p = .003). After HST was added in Model 2, the model fit improved ($\Delta R^2 = 0.05$) and HST was found to be positively associated (β = 0.27, t = 3.75, p <.001). The interaction coefficient of SpE and HST (SpE_c × HST_c) was significant in Model 3 (β = 0.08, t = 2.02, p). The relationship between spiritual empowerment and oral health outcomes was moderated by trust in the healthcare system (P. The result indicates that the instrumental value of oral health benefits through spiritual empowerment has a larger context for mothers with a higher level of trust in the healthcare system. This suggests that there is a joint importance of reflection and trust in decision-making about maternal health.

TABLE 9
Trust and Spiritual Empowerment: The Moderating Role of Trust

Model	Predictor	B	SE	β	t	p	ΔR^2
Model 1	SpE_c	0.27	0.09	0.23	3.03	0.003	—
Model 2	HST_c	0.3	0.08	0.27	3.75	0	0.05
Model 3	SpE_c × HST_c	0.1	0.05	0.08	2.02	0.044	0.01

Author 2025

Trust in the Health System as a Moderator of Structural Empowerment

Table 10 shows the moderating role of health system trust (HST) in the association between structural empowerment (StE) and maternal oral health outcomes (MOHO). In Model 1, β = 0.36, t = 5.71, p <.001. In the second step, the model was further improved by the inclusion of HST ($\Delta R^2 = 0.04$), and HST was identified as significant (β = 0.25, t = 3.82, p <. 001). In Model 3, the interaction term (StE_c × HST_c) was significant too (β = 0.11, t = 2.36, p =. 02), showing that HST plays a part in the connection between structural empowerment and oral health. The finding supports H8. This means that when mothers have a lot of trust in the health system, it will have a greater positive effect on oral health. This is because they will have more access to the health care organisation, more institutional support and greater structural empowerment. The text highlights the difference between empowering people and trusting them when it comes to improving maternal health at an institutional level.

TABLE 10Trust as a Moderator on the Relationship between Structural Empowerment

Model	Predictor	B	SE	β	t	p	ΔR^2
Model 1	StE_c	0.4	0.07	0.36	5.71	0	—
Model 2	HST_c	0.27	0.07	0.25	3.82	0	0.04
Model 3	StE_c × HST_c	0.12	0.05	0.11	2.36	0.02	0.02

Author 2025

DISCUSSION RESULT

The present study set out to examine the interaction between multidimensional empowerment and maternal oral health, with a particular focus on the moderating impact of trust in health systems. These results strongly support the idea presented about how mums' health is affected by what they know, how they act, how they feel and how things are set up. All four of these things were good and important for mums' health. Additionally, the results validate health system trust as a critical intermediary that strengthens the relationship between each empowerment domain and oral health outcomes. These insights are crucial for re-examining public health strategies to address the ongoing global issue of inadequate maternal oral health, particularly in developing countries.

The results of the study show that good maternal oral health outcomes are best predicted by educational and structural empowerment. The ability of educational empowerment H_1 to perform well is consistent with a large body of evidence on health literacy and self-confidence, where the two concepts are closely related. However, the expansion of knowledge and skills, as outlined in Bandura's social cognitive theory, is only a necessary step toward behavioral change. Consistent with previous studies, our findings indicate that providing personalized oral health education to women before and during pregnancy can improve oral health literacy and encourage preventive behaviors such as brushing teeth and attending dental appointments (Ghaffari et al., 2018; Vamos et al., 2015). With the growing development of various digital health tools, empowering education through the provision of accessible, reliable, and relevant information platforms is becoming increasingly scalable (Lecce et al., 2025; Palumbo et al., 2021; Sørensen, 2024).

Similarly, the strong effect of structural empowerment (H_4) further reinforces the idea that systemic and institutional changes are necessary. The findings show that structural empowerment is associated with positive health behaviors. This is supported by the existence of integrated referral pathways, equitable dental insurance coverage, and dental care facilities. This structural support provides a stronger foundation for pursuing healthy behaviors. These results are consistent with studies using the Maternal Health Referral System Quality (MHRSQ) and Maternal Dental Insurance Coverage (MDICS) scales, both of which show that reducing physical and financial barriers to access encourages the use of continuous care during pregnancy (Ćwirynkało et al., 2025; Rahimi et al., 2025). It is crucial to recognize that this form of individual agency (which has been developed through education) requires responsive and equitable health systems. These systems have the capacity to translate intentions into concrete actions, which in turn produce sustainable outcomes.

A more holistic, multi-level approach is important, as shown by the statistically significant contributions of social and spiritual empowerment (H_2 and H_3). These had comparatively lower predictive strength. Indeed, social empowerment can lead to positive changes in health behaviours, which is consistent with the principles of the Social Ecological Model that emphasise the significant influence of social relationships and community networks on health behaviours. The latest research indicates that a range of individuals and groups, including partners, family members and community health workers, play a crucial role in addressing the challenges associated with oral health issues. These efforts encompass the provision of psychosocial support and the facilitation of access to services. ((Ahmed et al., 2025; Wilson et al., 2025). This is an interesting result given that spiritual empowerment is not yet commonly studied in dental public health. Faith is important for many pregnant women, especially in religious communities, as it can help them cope, stay motivated, and maintain good health behaviours for longer. This aligns with new studies using tools such as the Spiritual Coping Scale (SCS) and the Maternal Values Affirmation Exercise (MVAE) to demonstrate how messages based on spirituality, delivered through faith structures and spiritual values, can strengthen emotions and commitment to desired behaviours, such as maintaining good oral hygiene (Harvey & Wallace, 2025; Hassan & Doğan, 2025). This dimension is important as it addresses the recognized gap in the predominantly biomedical focus of maternal oral health program (Collins et al., 2021; Leigh, 2019).

The study found that public trust in the health system has a significant impact on the relationship between their perceptions of quality of care and their quality of life (H5 to H8). In addition, it was also observed that trust can reinforce the positive impact of each of the four dimensions of empowerment on oral health outcomes. The concept of moderation in this context is in line with the principles of Institutional Trust Theory. This theory states that individuals' tendency to follow health advice and engage in recommended behaviors depends on their level of trust in healthcare providers and the healthcare system (Marshall et al., 2026). In other words, educational empowerment is more effective when trust levels are high, indicating that pregnant women are more likely to process health information and engage in health behaviors if they perceive the information providers to be competent and benevolent. Similarly, the interaction between trust and structural empowerment shows that policies aimed at improving access, such as health insurance or referral systems, will have a greater impact on populations that trust the institutions implementing them. This partly explains why structural interventions in environments with high levels of institutional distrust are less successful, even with strong interventions (Kludacz-Alessandri et al., 2025). Scales such as the Trust in Maternity Care Providers Scale (TMCPS) and the Health System Fairness Scale-Pregnancy (HSFS-P) support our findings. These scales are associated with higher levels of participation in health programs and greater adherence to preventive care, along with increased perceptions of fairness and competence of service providers (Griffith et al., 2025; Olarewaju & Tundealao, 2025).

These findings are particularly important for health service planning in countries where the majority of the population is Muslim or developing, as health practices are closely linked to culture and the way the country is governed. The success of this type of integrated spiritual empowerment model may ultimately

depend on the interaction between empowerment and belief, or more generally, the interaction between spiritual empowerment and secular rationality. Including religious elements in programs (e.g., religion-based approaches to problem solving) can make programs more acceptable to different cultures, more relevant, and can help build trust and encourage people to participate in these communities (Hossain et al., 2025; Piracha et al., 2024). In this regard, this study shifts the focus from a one to one clinical lens to a complementary model in which building institutional trust is as important as providing empowerment tools. Consequently, future maternal oral health initiatives must adopt a two-pronged strategy: the first empowers women as individuals, within their communities, and in their spiritual pursuits, and the second deliberately cultivates an open, fair, and reliable health system. A life-cycle approach is necessary to achieve implementable and sustainable change in maternal oral health, which can ultimately lead to better pregnancy outcomes and long-term well-being (Bobetsis et al., 2020).

CONCLUSION

A multifaceted empowerment approach, supported by a reliable health care system, is necessary to improve maternal oral health outcomes, according to the findings of this study based on a holistic analysis. The results clearly show the interrelated nature of educational, social, spiritual, and structural empowerment, all of which are important determinants of oral health. Trust in the health system is a universal moderating variable, indicating that empowerment-focused interventions are most effective when implemented within a system that is perceived as credible, fair, and honest. To ensure the long-term success and sustainability of initiatives in a religious context, it is essential to avoid a purely biomedical approach. Instead, a multifaceted strategy is needed that focuses on individual empowerment, mobilization of community and spiritual resources, and securing structural support. This approach strengthens trust between pregnant women and healthcare providers, which is essential for the effectiveness and sustainability of these initiatives.

LIMITATION

Nevertheless, several limitations of this study should be noted. First, the way this study was designed meant that it only looked at information at a single point in time. While this does reveal important associations, it does not allow us to know what caused the changes we saw in people's self-confidence and oral health. Further longitudinal research is needed to investigate these associations during pregnancy and the postpartum period. Second, reliance on self-reported metrics for basic concepts such as oral health practices and perceptions of empowerment may lead to social desirability bias and recall bias. Although some clinical measures, including plaque index, were included, a more comprehensive integration of objective clinical data is needed in future studies. Third, this study was conducted in the context of a specific socio-cultural and health care system in a developing country. However, the extent to which these findings, particularly those related to spiritual empowerment, can be generalized to more secular or economically advanced contexts with different health systems is also a limitation. Therefore, this model needs to be tested in a broader population to see how well it can be used in general and to identify specific factors not included in this study.

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APPENDIX A Variable Instrument Research Data

Variable	Code	Indicator	Measurement	Scale	Source
Educational Empowerment	EE1	Personalized antenatal oral health education	Maternal Oral Health Knowledge Questionnaire (MOHKQ)	Likert 1–5	(Boggess et al., 2011)
	EE2	Self-care skill demonstration	Maternal Oral Care Self-Efficacy Scale (MOC-SES), 8 items	Likert 1–5	(Wretman et al., 2020)
	EE3	Digital health literacy	eHealth Literacy Scale (eHEALS), 8 items	Likert 1–5	(Paige et al., 2017)
Social Empowerment	SE1	Peer support groups	Pregnancy Support Group Scale (PSGS), 6 items	Likert 1–5	(Tsai et al., 2025)

Variable	Code	Indicator	Measurement	Scale	Source
	SE2	Family involvement	Family Involvement in Maternal Oral Care (FIMOC), 7 items	Likert 1–5	(Çınar et al., 2025)
	SE3	Community health worker support	Community Health Worker Impact Scale for Pregnancy (CHWIS-P), 5 items	Likert 1–5	(Ansari et al., 2025; Helova et al., 2025)
Spiritual Empowerment	SPE1	Religious-based health messages	Religious Health Messages Acceptability Scale (RHMAS), 6 items	Likert 1–5	(Ejem et al., 2025; Husain et al., 2025)
	SPE2	Prayer-based stress management	Spiritual Coping Scale (SCS), 7 items	Likert 1–5	(Hassan & Doğan, 2025; Söylev et al., 2025)
	SPE3	Values affirmation	Maternal Values Affirmation Exercise (MVAE)	Reflective writing	(Harvey & Wallace, 2025; Petersen et al., 2025)
Structural Empowerment	STE1	Integrated referrals	Maternal Health Referral System Quality (MHRSQ), 4 items	Likert 1–5	(Onsongo et al., 2025; Rahimi et al., 2025)
	STE2	Service accessibility	Perceived Access to Maternal Dental Care (PAMDC), 5 items	Likert 1–5	(Frey-Furtado et al., 2025; Lee et al., 2025)
	STE3	Insurance coverage	Maternal Dental Insurance Coverage Scale (MDICS), 4 items	Likert 1–5	(Ćwirynkało et al., 2025; Jing et al., 2025)
Maternal Oral Health Outcomes	MOHO 1	Oral health knowledge	Maternal Oral Health Literacy Assessment (MOHLA)	Likert 1–5	(Kamolchaiwanich et al., 2025; Vilella et al., 2016)
	MOHO 2	Plaque index	Modified Silness & Löe Index (clinical measure)	Clinical index	(Fatemipour et al., 2025; Silness & Löe, 1966)
	MOHO 3	Dental service utilization	Prenatal Dental Visit Questionnaire (PDVQ), 5 items	Binary (Yes/No) / Likert	(Kamalabadi et al., 2025; Patil et al., 2025)
	MOHO 4	Self-care practices	Maternal Oral Self-Care Scale (MOSCS), 8 items	Likert 1–5	(Derman et al., 2025; Özsavran et al., 2025)
Health System Trust	HST1	Trust in providers	Trust in Maternity Care Providers Scale (TMCPS), 10 items	Likert 1–5	(Griffith et al., 2025; Lojander et al., 2025)
	HST2	System fairness	Health System Fairness Scale-Pregnancy (HSFS-P), 6 items	Likert 1–5	(Olarewaju & Tundealao, 2025; Ouyang & Wei, 2025)
	HST3	Adherence intention	Medical Advice Adherence Scale-Pregnancy (MAAS-P), 5 items	Likert 1–5	(Andonotopo et al., n.d.; Wolf et al., 2025)

Author Finding 2025