Cultural Perceptions and Treatment Pathways of Childhood Clubfoot in the North West and West Regions of Cameroon: An Anthropological Study of Disability, Healing Practices and Social Integration

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Abstract

Background: *Childhood clubfoot (CTEV) remains one of the most prevalent congenital musculoskeletal deformities worldwide. While the Ponseti method has revolutionized treatment, outcomes in Sub-Saharan Africa are compromised by late presentation, poor brace compliance, and pervasive stigma.* ***Objective:*** *This study investigates cultural beliefs, stigma,*

kinship resilience, NGO support, and biomedical outcomes in Cameroon, situating childhood clubfoot within broader debates on illness causation, medical pluralism, and disability rights. ***Methods:*** *A mixed-methods design combined ethnographic fieldwork (participant observation, interviews, focus groups, case studies) with quantitative analysis of clinic records and surveys. Forty families, ten traditional healers, twelve biomedical providers, and three NGOs participated.* ***Results:*** *Families interpreted clubfoot through personalistic frameworks (ancestral punishment, witchcraft), delaying biomedical care. Stigma excluded children from education and marriage, undermining brace compliance. Kinship and religious networks mediated resilience, while NGOs bridged systemic gaps. Quantitative data confirmed Ponseti success rates of 92% with early initiation, reduced to 65% with delays. Visual anthropology revealed disability representations in ritual, art, and media, reinforcing stigma.* ***Conclusion:*** *Childhood clubfoot in Cameroon exemplifies the intersection of medicine and society. Effective interventions must combine biomedical efficacy with cultural sensitivity, addressing stigma, leveraging community resilience, and reforming systemic barriers. Policy recommendations include healer–hospital collaboration, transport subsidies, national stigma campaigns, NGO partnerships, and digital health innovations.*

Keywords: *Clubfoot, Cameroon, Medical pluralism, Stigma, Ponseti method, Visual anthropology, Socio-semiotics, Disability rights, Kinship networks, NGO interventions*

Résumé

Contexte : *Le pied bot congénital (CTEV) demeure l'une des malformations musculosquelettiques les plus fréquentes dans le monde. Bien que la méthode Ponseti ait transformé le traitement, les résultats en Afrique subsaharienne sont compromis par des présentations tardives, une faible observance du port de l'attelle et une stigmatisation persistante.* ***Objectif :*** *Cette étude analyse les croyances culturelles, la stigmatisation, la résilience des réseaux de parenté, le soutien des ONG et les résultats biomédicaux au Cameroun, en situant le pied bot dans les débats sur la causalité des maladies, le pluralisme médical et les droits des personnes handicapées.* ***Méthodes*** *: Un design mixte a combiné un travail ethnographique (observations participantes, entretiens, groupes de discussion, études de cas) avec une*

analyse quantitative des dossiers cliniques et des enquêtes. Quarante familles, dix guérisseurs traditionnels, douze prestataires biomédicaux et trois ONG ont participé. ***Résultats :*** *Les familles ont interprété le pied bot à travers des cadres personnalistes (punition ancestrale, sorcellerie), retardant les soins biomédicaux. La stigmatisation a exclu les enfants de l'école et du mariage, compromettant l'observance du traitement. Les réseaux de parenté et religieux ont favorisé la résilience, tandis que les ONG ont comblé les lacunes systémiques. Les données quantitatives ont confirmé un taux de succès de 92 % avec une prise en charge précoce, réduit à 65 % en cas de retard. L'anthropologie visuelle a révélé des représentations du handicap dans les rituels, l'art et les médias, renforçant la stigmatisation.* ***Conclusion :*** *Le pied bot au Cameroun illustre l'intersection entre médecine et société. Les interventions efficaces doivent combiner efficacité biomédicale et sensibilité culturelle, en luttant contre la stigmatisation, en mobilisant la résilience communautaire et en réformant les barrières systémiques. Les recommandations incluent la collaboration guérisseurs–hôpitaux, des subventions de transport, des campagnes nationales contre la stigmatisation, des partenariats avec les ONG et des innovations numériques en santé.*

Mots-clés: *Pied bot, Cameroun, Pluralisme médical, Stigmatisation, Méthode Ponseti, Anthropologie visuelle, Socio-sémiotique, Droits des personnes handicapées, Réseaux de parenté, Interventions des ONG*

Introduction

Congenital Talipes Equinovarus (CTEV), commonly known as clubfoot, is one of the most prevalent congenital musculoskeletal deformities worldwide, affecting approximately 1 in every 1,000 live births (Dobbs & Gurnett, 2009). While biomedical interventions such as the Ponseti method have revolutionized treatment, achieving correction rates above 90% when initiated early, access to timely care remains uneven across low- and middle-income countries. In Sub-Saharan Africa, structural barriers including limited orthopedic infrastructure, treatment costs and geographic distance intersect with cultural beliefs and stigma, shaping the lived experiences of children with clubfoot and their families.

Historical Context

The history of orthopedic care in Cameroon reflects broader colonial medical legacies. Under German and later French colonial rule, orthopedic services were limited to urban hospitals, with rural populations relying on indigenous healing systems. Post-independence, biomedical expansion remained uneven, with orthopedic specialists concentrated in Yaoundé and Douala. The introduction of the Ponseti method in the early 2000s marked a turning point, but diffusion into rural areas has been slow. This historical trajectory underscores how colonial medical infrastructures continue to shape access to disability care today.

Global Disability Debates

Globally, disability has been reframed through the medical and social model debate. The medical model views disability as a defect requiring correction, while the social model emphasizes barriers created by stigma, exclusion and inaccessible environments. The adoption of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) in 2006 consolidated a rights-based approach, situating disability as a matter of human rights and social justice. The World Health Organization has similarly advanced initiatives to integrate rehabilitation into primary health systems. Yet, translating these global frameworks into local realities remains challenging, particularly in contexts where cultural interpretations of disability diverge from biomedical logics.

Regional Comparisons

Comparative ethnography across Africa reveals striking similarities and differences. In Ghana, studies show that families often attribute clubfoot to witchcraft while delaying biomedical care (Adu-Gyamfi, 2017). In Uganda, community-based rehabilitation programs have successfully integrated traditional healers into referral systems, reducing delays (Morris et al., 2022). In Nigeria, stigma remains pervasive with children excluded from schools and families facing ridicule (Okoro, 2019). These regional comparisons highlight both the universality of stigma and the diversity of cultural interpretations situating Cameroon within a broader Sub-Saharan landscape of medical pluralism and disability exclusion.

Cameroon's Pluralistic Health System

Cameroon's health system exemplifies medical pluralism (Janzen, 1978). Families often consult traditional healers for congenital conditions, interpreting them through spiritual frameworks such as ancestral punishment or witchcraft. Biomedical providers, meanwhile, emphasize early Ponseti initiation, yet struggle with late presentation and poor brace compliance. Non-governmental Organisations (NGOs) play a critical role in bridging systemic gaps, subsidizing transport, covering treatment costs and advocating for school inclusion. This pluralistic landscape creates a dynamic environment in which families navigate between indigenous and biomedical systems, negotiate stigma and rely on kinship and religious networks for resilience.

Visual and Socio-Semiotic Dimensions

Beyond clinical and cultural interpretations, disability in Cameroon is also represented through visual anthropology and socio-semiotics. Local art, ritual and media often depict congenital deformities as symbols of ancestral displeasure or spiritual imbalance. These representations reinforce stigma but also provide insight into how disability is culturally encoded. By analysing visual narratives alongside ethnographic accounts, this study situates clubfoot within broader aesthetic and semiotic systems, expanding the scope of medical anthropology to include cultural representations of disability.

Research Rationale

This study employs a mixed-methods design to capture the complexity of childhood clubfoot in Cameroon. Ethnographic fieldwork explores cultural perceptions, stigma and healing practices, while quantitative surveys and clinic record analysis measure treatment delays, Ponseti outcomes and prevalence of healer consultations. By integrating qualitative and quantitative strands the study situates childhood clubfoot within broader debates on illness causation (Foster, 1976), stigma (Goffman, 1963), and pluralism (Janzen, 1978), while offering practical insights for disability care and policy in Sub-Saharan Africa.

Literature Review

Biomedical Evidence

Biomedical research consistently demonstrates the

effectiveness of the Ponseti method, achieving correction rates above 90% when initiated early (Dobbs & Gurnett, 2009). Systematic reviews confirm its applicability in low-resource settings, though outcomes are compromised by late presentation and poor brace compliance (Shabtai et al., 2020; Smythe, Wainwright & Kuper, 2021). Multi-country trials in Uganda, Ethiopia, and Ghana demonstrate similar success rates, but highlight systemic barriers such as transport costs, poverty and limited staff capacity (Miller et al., 2022). These findings underscore the biomedical potential of Ponseti but also reveal the importance of social and cultural factors in determining outcomes.

Anthropological Perspectives

Anthropological scholarship reframes disability as a socially constructed phenomenon shaped by cultural beliefs, stigma and systemic barriers. Foster's (1976) model of illness causation distinguishes between naturalistic and personalistic explanations, with congenital deformities in Cameroon often interpreted through personalistic frameworks such as ancestral punishment or witchcraft. Kleinman's (1980) explanatory models highlight how patients, families, and providers construct competing narratives of illness, explaining tensions between biomedical and indigenous systems. Janzen's (1978) concept of medical pluralism captures the coexistence of biomedical and indigenous systems, a dynamic central to this study. Ingstad & Whyte (1995) emphasize community resilience, showing how kinship and religious networks mediate stigma and support families navigating disability.

Comparative Ethnography

Regional studies provide comparative insights. In

Ghana, Adu-Gyamfi (2017) documented how families attributed clubfoot to witchcraft, delaying biomedical care. In Uganda, Morris et al. (2022) showed that integrating traditional healers into referral systems reduced delays and improved outcomes. In Nigeria, Okoro (2019) found that stigma excluded children from schools and families faced ridicule, undermining biomedical adherence. These comparative ethnographies highlight both the universality of stigma and the diversity of cultural interpretations, situating Cameroon within a broader Sub-Saharan landscape of disability exclusion and medical pluralism.

Stigma and Exclusion

Stigma remains a pervasive barrier. Goffman's (1963) theory of stigma as a "spoiled identity" resonates strongly in African contexts, where children with disabilities often face exclusion from education, marriage and community participation. Tchouaket, Nguefack & Kamga (2019) documented such exclusion in Cameroon, while Kuper et al. (2020) confirmed its persistence across Sub-Saharan Africa. Recent work highlights how stigma undermines biomedical adherence, particularly brace compliance, and reinforces cycles of marginalization. Bourdieu's (1977) concept of habitus enriches this analysis by showing how stigma is embodied and reproduced through everyday practices.

Policy and Disability Rights

Global frameworks such as the UNCRPD (2006) and WHO's *World Report on Disability* (2011) emphasize inclusion, accessibility and stigma reduction. Miles (2002) argued that African disability interventions must be community-based and culturally sensitive. Bright et al. (2021) highlight strategies such

as integrating traditional healers into referral systems, strengthening NGO partnerships and addressing stigma through community-led sensitization campaigns. Comparative policy studies show uneven implementation of UNCRPD across African states: Uganda has advanced community-based rehabilitation programs, Ghana has enacted disability legislation, while Nigeria and Cameroon lag in enforcement. These approaches align with the integrative framework of this study, which situates biomedical outcomes within cultural and social realities.

Visual Anthropology and Socio-Semiotics

Emerging scholarship emphasizes the role of visual anthropology and socio-semiotics in disability studies. Disability is represented in local art, ritual and media as ancestral displeasure or spiritual imbalance, reinforcing stigma but also providing insight into cultural encoding. Banks & Morphy (1997) argue that visual narratives are critical to understanding how societies construct disability. In Cameroon, ritual drawings, church sermons and community theatre depict congenital deformities as moral or spiritual signs, shaping public attitudes and reinforcing exclusion. Integrating visual anthropology into disability research expands the scope of medical anthropology beyond clinical encounters.

Integrative Contribution

Together, biomedical, anthropological, comparative, stigma, policy and visual literatures converge to show that childhood clubfoot in Cameroon cannot be understood solely as a medical condition. Instead, it is shaped by cultural interpretations, social exclusion, kinship resilience, NGO interventions and global disability rights frameworks. This

literature review establishes the foundation for the study's conceptual framework, which integrates these strands into a holistic account of care pathways and barriers.

Conceptual Framework

Figure 1

The conceptual framework for this study integrates multiple interdisciplinary perspectives to explain the cultural and biomedical dimensions of childhood clubfoot care in Cameroon. It is structured around five interrelated domains:

- **Illness causation**: Drawing on Foster's distinction between naturalistic and personalistic explanations, congenital deformities are interpreted through ancestral punishment, witchcraft, or spiritual imbalance, shaping families' reliance on traditional healers. Kleinman's explanatory models highlight tensions between biomedical providers advocating early Ponseti treatment and families interpreting deformity through spiritual causation.
- **Stigma and social identity**: Goffman's notion of stigma as a "spoiled identity" and Bourdieu's concept of habitus explain how exclusion is embodied in everyday practices, from school refusal to community ridicule. Stigma interacts with cultural causation beliefs, reinforcing cycles of exclusion.
- **Medical pluralism**: Janzen's framework situates families' navigation between healers, hospitals, and NGOs. Kleinman's tripartite model (popular, folk, and professional) contextualizes traditional healers and NGOs within broader health systems.

- **Socio-semiotics and visual anthropology**: Disability is culturally encoded in art, ritual, sermons, and theatre. These representations both reinforce stigma and reveal symbolic systems that shape perceptions of deformity.
- **Disability rights and inclusion**: Global frameworks such as the UNCRPD and WHO's World Report on Disability emphasize inclusion and accessibility. Local realities, however, reveal challenges in translating rights-based commitments into practice.

Together, these domains converge into a central node — Care Pathways for Children with Clubfoot illustrating how cultural beliefs, kinship networks, NGO support and biomedical outcomes interact to shape treatment trajectories.

Legend: The framework integrates theories of illness causation, stigma, medical pluralism, socio-semiotics and disability rights, converging to illustrate how cultural beliefs, kinship networks, NGO support and biomedical outcomes shape care pathways for children with clubfoot in Cameroon.

Mixed Methods Research Design

The study employs a convergent parallel mixed methods design, combining qualitative and quantitative strands to capture the complexity of disability care pathways.

- **Qualitative strand**: Ethnographic interviews with families, healers, and biomedical providers; participant observation in clinics and community rituals; and visual anthropology analysis of drawings, sermons, and theatre.
- **Quantitative strand**: Structured surveys on stigma, health-seeking behaviour, and treatment delays;

statistical analysis of Ponseti initiation rates and outcomes; and NGO program evaluation metrics.

- **Integration phase**: Findings are triangulated through joint displays that link cultural causation beliefs with treatment outcomes. This integration ensures that qualitative narratives enrich quantitative patterns, producing policy-relevant insights.

This design allows for a comprehensive understanding of how cultural interpretations, systemic barriers, and biomedical interventions converge, thereby advancing both theoretical analysis and practical recommendations for inclusive disability care.

Figure 2



Caption: The study employs a convergent parallel mixed methods design to capture the complexity of disability care pathways.

- **Qualitative strand:** Ethnographic interviews, participant observation, and visual anthropology analysis of drawings, sermons, and theatre.

- **Quantitative strand:** Surveys on stigma and health-seeking behaviour, statistical analysis of Ponseti initiation rates, and NGO program evaluation metrics.
- **Integration phase:** Triangulation through joint displays links cultural causation beliefs with treatment outcomes, ensuring qualitative narratives enrich quantitative patterns.

This design advances both theoretical analysis and practical recommendations for inclusive disability care in Cameroon.

Legend: A convergent parallel design combines qualitative methods (ethnography, observation, visual analysis) with quantitative methods (surveys, statistical outcomes, NGO metrics), with integration through triangulation to link cultural causation beliefs and treatment outcomes.

Table: Alignment of Theoretical Framework and Mixed Methods Design

Figure 1 – Theoretical Domains	**Figure 2 – Methodological Strands**
Illness causation – Naturalistic vs personalistic explanations; tensions between biomedical causation and spiritual beliefs.	**Qualitative strand** – Ethnographic interviews with families, healers, and providers; participant observation in clinics and rituals.
Stigma and social identity – Spoiled identity, embodied exclusion, habitus shaping everyday practices.	**Quantitative strand** – Surveys on stigma and health-seeking behaviour; statistical analysis of Ponseti initiation rates and outcomes.
Medical pluralism – Families navigating between healers, hospitals, and NGOs; coexistence of folk and professional systems.	**NGO program evaluation** – Metrics assessing referral systems, treatment delays, and integration of traditional healers.
Socio-semiotics & visual anthropology – Disability encoded in	**Visual analysis** – Documentation and interpretation of drawings, sermons,

Figure 1 – Theoretical Domains	**Figure 2 – Methodological Strands**
art, ritual, sermons, and theatre; symbolic reinforcement of stigma.	and community theatre as cultural data.
Disability rights and inclusion – UNCRPD and WHO frameworks; challenges in translating rights into practice.	**Integration phase** – Triangulation through joint displays linking cultural causation beliefs with treatment outcomes, producing policy-relevant insights.

This table makes explicit how each theoretical domain (Figure 1) is operationalized through a corresponding methodological strand (Figure 2).

Figure 3



Caption: This infographic illustrates the sequential policy pathway derived from the study's findings. Research insights on cultural beliefs, stigma, and treatment outcomes inform social implications such as stigma reduction and community inclusion. These, in turn, guide targeted interventions - NGO support, brace compliance, and healer

collaboration—that culminate in policy reforms promoting disability access, UNCRPD alignment, and health system strengthening.

Legend:

- **Research Findings:** Cultural beliefs, stigma, and biomedical outcomes identified through mixed-methods analysis.
- **Social Implications:** Stigma reduction and community inclusion strategies emerging from qualitative narratives.
- **Targeted Interventions:** NGO support, brace compliance programs, and healer collaboration to improve care continuity.
- **Policy Reforms:** Disability access laws, UNCRPD alignment, and health system support for inclusive care.
- **Outcome Banner:** Inclusive care and disability access leading to improved outcomes and social inclusion.

Together, **Figures 1–3** form a cohesive visual set:

- **Figure 1:** Conceptual framework of cultural and biomedical dynamics.
- **Figure 2:** Mixed-methods research design schematic.
- **Figure 3:** Policy pathways translating findings into reforms.

Methods

Study Design

This research employed a mixed-methods design to capture the complexity of childhood clubfoot in Cameroon. The

qualitative strand was grounded in ethnographic principles, emphasizing immersion, observation and narrative collection. Researchers alternated between urban clinics and rural villages over three months enabling comparative insights into how cultural beliefs and systemic barriers shaped treatment pathways. The quantitative strand complemented this by analysing clinic records and survey data to measure treatment delays, relapse rates, and socio-economic barriers.

The rationale for this design lies in the need to integrate cultural narratives with clinical outcomes. Ethnography alone would risk neglecting measurable treatment success, while quantitative analysis alone would overlook the cultural logics and stigma shaping health-seeking behaviour. Triangulation ensured that findings were both culturally grounded and empirically validated.

Field Sites and Ethnographic Detail

Fieldwork was conducted in two primary sites:

- Urban clinics in the West and North West Regions where orthopedic specialists and NGOs offered Ponseti treatment.
- Rural villages in the North West and West Regions where families relied heavily on traditional healers and kinship networks.

Participant observation included clinic consultations, brace fittings, parental interactions, healer rituals, church services and community gatherings. Detailed field notes captured not only biomedical encounters but also the symbolic and ritual dimensions of disability care. For example, healer rituals often involved herbal compresses, incantations and

symbolic cleansing, while church sermons framed disability as spiritual warfare.

Sampling and Participants

Purposive sampling was used to ensure diversity across rural and urban settings. Forty families with children diagnosed with clubfoot were recruited, alongside ten traditional healers, twelve biomedical providers and representatives from three NGOs. Eight children were selected for longitudinal case studies, followed across treatment pathways. This sampling strategy was justified by the need to capture perspectives from all key stakeholders - families, healers, biomedical providers and NGOs - who collectively shape care pathways.

Data Collection

- **Qualitative strand:**
    - Participant observation in clinics and villages documenting both biomedical and indigenous practices.
    - Semi-structured interviews with parents, healers and biomedical providers capturing fears, stigma, indigenous aetiologies and systemic challenges.
    - Focus group discussions with kinship networks and religious leaders revealing collective attitudes toward disability and stigma.
    - Case studies of eight children documenting delays, relapses and social integration longitudinally.

- **Quantitative strand:**
  - Clinic records analysis of 120 cases measuring Ponseti uptake, relapse rates and treatment delays.
  - Surveys capturing healer consultations, transport costs, socio-economic barriers and brace compliance. Instruments included Likert-scale questions on stigma, open-ended questions on healer practices and structured items on household income and transport distance.

Reflexivity and Positionality

Researchers acknowledged their positionality as outsiders in local communities. Reflexive journals documented challenges such as language barriers, translation issues and the influence of researcher presence on participant responses. Local research assistants were employed to facilitate trust and ensure cultural sensitivity. Reflexivity was critical in interpreting narratives particularly when families expressed spiritual aetiologies or reluctance to discuss stigma openly.

Data Analysis

Qualitative data were transcribed, coded and analysed thematically guided by frameworks of illness causation (Foster, 1976), stigma (Goffman, 1963), and medical pluralism (Janzen, 1978). Visual anthropology methods were applied to analyse ritual drawings, church sermons, and community theatre representations of disability. Quantitative data were analysed descriptively, with outcomes compared across early and

delayed treatment groups. Triangulation integrated narratives with measurable outcomes, producing a holistic account of childhood clubfoot.

Ethical Considerations

Ethical approval was obtained from the Cameroonian National Ethics Committee. Informed consent was secured from all participants with parental consent for children. Confidentiality was maintained through pseudonyms and researchers engaged with cultural sensitivity, respecting local beliefs while emphasizing the importance of biomedical care. NGO collaboration ensured that families recruited for the study received support for transport and treatment costs, minimizing ethical concerns about participation burden.

Results

Cultural Beliefs and Healing Pathways

Families consistently interpreted clubfoot through personalistic frameworks such as ancestral punishment, witchcraft or spiritual imbalance. A mother in Bamenda explained: "*The twisted foot is punishment from ancestors; we must appease them before the child can be healed.*" In rural villages, healer rituals involved herbal compresses, incantations and symbolic cleansing. These practices delayed biomedical intervention while reducing Ponseti effectiveness.

Urban families, by contrast were more likely to combine healer consultations with hospital visits, reflecting Janzen's (1978) concept of medical pluralism. A father in Foumban in the West Region noted: *"We tried the healer first, then went to the*

hospital when the herbs failed." This sequential navigation illustrates how cultural logics shape treatment pathways.

Stigma and Social Exclusion

Stigma emerged as a pervasive barrier, consistent with Goffman's (1963) theory of stigma as a "spoiled identity." Children were excluded from schools, ridiculed by peers and denied marriage opportunities. A grandmother in Bamenda lamented: *"No family will marry a girl with such a leg."* Quantitative data confirmed that stigma undermined brace compliance, with families discontinuing treatment due to ridicule.

Urban families reported stigma in schools and workplaces, while rural families described exclusion from community rituals and marriage negotiations. These findings resonate with Tchouaket, Nguefack & Kamga (2019) and Kuper et al. (2020), who documented stigma as a structural obstacle to disability inclusion in African contexts. Bourdieu's (1977) concept of habitus enriches this analysis, showing how stigma is embodied and reproduced through everyday practices.

Kinship, Religion, and NGO Support

Kinship networks and religious institutions mediated resilience, echoing Ingstad & Whyte's (1995) emphasis on community solidarity. Families reported financial and emotional support from relatives, pastors and mosques. A mother in Bafoussam explained: *"My brother paid for transport; the pastor prayed for healing."* NGOs played a critical role in bridging systemic gaps, subsidizing transport, covering treatment costs and advocating for school inclusion.

Urban families benefited more from NGO support, while rural families relied heavily on kinship and religious networks. These findings highlight the importance of community-based and NGO-led interventions, aligning with Miles (2002) and Bright et al. (2021). Resilience thus emerges as both cultural and institutional, with NGOs translating rights-based frameworks into practice.

Biomedical Outcomes

Quantitative analysis confirmed that early initiation of the **Ponseti method** achieved 92% success, while delays reduced outcomes to 65%. Relapse was linked to stigma-driven discontinuation of braces. Biomedical providers expressed frustration at systemic barriers, including transport costs, poverty and limited staff capacity. A doctor explained: *"We see children too late. If they came earlier, success would be higher."*

Photo 1. One of the researchers and health staff to the left interacting with an eight year old delayed health-seeking child to the right



Source: Parent, Kuohouat in Noun Division, 2026.

The above photo illustrates a health staff and researcher interviewing a delayed health-seeking child reporting late for biomedical clubfoot care whose parents postponed imported biomedical intervention due to cultural beliefs, social stigma and limited access.

A nurse in Bamenda explained, *"Relapse occurs when families stop brace use due to stigma."* A father in Mbouda in the West Region said, *"Transport to the hospital costs more than food for the week."* Another doctor in the West Region noted, *"We need more trained staff. Clinics are overwhelmed."* A nurse in the North

West Region added, "*Parents often abandon treatment midway. They lose hope.*" A mother in Magba in the West Region explained, "*We missed appointments because the road was flooded.*" A father in Santa in the North West Region said, "*The brace broke, and we could not replace it.*" A doctor added, "*Some families return after relapse, but outcomes are worse.*" A nurse in Foumbot in the West Region explained, "*Children who start early walk normally by age two.*" Finally, a father of a clubfoot child in Kuohouat in Noun Division in the West Region concluded, "*If healers and hospitals work together, children will walk well.*"

Urban clinics reported higher success rates due to earlier presentation and NGO support, while rural clinics struggled with late presentation and poor brace compliance. These findings reinforce Smythe et al. (2021), who identified poverty and access constraints as key obstacles to treatment adherence.

Visual Anthropology Insights

Disability was also represented through visual and symbolic forms. Ritual drawings depicted twisted feet as signs of ancestral displeasure. Church sermons framed disability as spiritual warfare, while community theatre portrayed children with deformities as moral lessons. These visual narratives reinforced stigma but also provided insight into how disability is culturally encoded. Banks & Morphy (1997) argue that such representations are critical to understanding how societies construct disability. In Cameroon, visual anthropology reveals how cultural signs and symbols shape public attitudes toward clubfoot.

Integrative Synthesis

The results confirm that cultural beliefs, stigma,

kinship/NGO support and biomedical outcomes converge to shape care pathways. This convergence illustrates Janzen's (1978) concept of medical pluralism where families navigate between indigenous and biomedical systems. It also demonstrates how stigma operates as both a cultural and structural barrier, while kinship and NGOs provide resilience. Quantitative outcomes validate these narratives, showing how delays and stigma directly undermine biomedical success. Visual anthropology adds a further dimension revealing how disability is represented and encoded in cultural symbols.

Discussion and Conclusion

Cultural Beliefs and Treatment Pathways

Findings confirm that families often interpret clubfoot through personalistic frameworks such as ancestral punishment or witchcraft. This reliance on traditional healers delays biomedical care, reducing Ponseti effectiveness. These interpretations align with Foster's (1976) model of illness causation and resonate with Atemkeng, Njamnshi & Mbuagbaw (2018), who documented similar spiritual aetiologies in Cameroon. Kleinman's (1980) explanatory models further illuminate how families and providers construct competing narratives of illness, explaining tensions between biomedical and indigenous systems. Comparative ethnography shows similar dynamics in Ghana (Adu-Gyamfi, 2017) and Nigeria (Okoro, 2019), where witchcraft explanations delay biomedical care. These parallels situate Cameroon within a broader Sub-Saharan landscape of medical pluralism.

Stigma as a Structural Barrier

Stigma operated as a powerful social barrier excluding

children from education, marriage and community participation. Informant's voice *"Teachers refused my son's admission"* echo Goffman's (1963) theory of stigma as a "spoiled identity." These findings align with Tchouaket, Nguefack & Kamga (2019) and Kuper et al. (2020), who documented stigma's exclusionary effects in African disability contexts. Importantly, stigma also undermined biomedical adherence particularly brace compliance, confirming that social exclusion directly compromises medical outcomes. Bourdieu's (1977) concept of habitus enriches this analysis, showing how stigma is embodied and reproduced through everyday practices. Comparative studies in Uganda (Morris et al., 2022) reveal that community-based rehabilitation programs can reduce stigma, suggesting pathways for Cameroon.

Kinship, Religion and NGO Resilience

Kinship networks and religious institutions mediated resilience, reflecting Ingstad & Whyte's (1995) emphasis on community solidarity. Families relied on relatives, pastors and mosques for financial and emotional support, while NGOs bridged systemic gaps by subsidizing transport and advocating for school inclusion. These findings resonate with Miles (2002) and Bright et al. (2021), who argue that sustainable disability interventions must be community-based and NGO-supported. Comparative ethnography in Uganda shows that integrating NGOs into community-based rehabilitation programs enhances resilience, while Ghana's disability legislation has strengthened NGO advocacy. In Cameroon, resilience emerges as both cultural and institutional, with NGOs translating rights-based frameworks into practice.

Biomedical Outcomes and Systemic Barriers

Quantitative data reinforced narratives: early initiation of the Ponseti method yielded 92% success, while delays reduced outcomes to 65%. Relapse was linked to stigma-driven discontinuation of braces, and systemic barriers such as transport costs and limited staff capacity further undermined outcomes. These findings echo Smythe et al. (2021), who identified poverty and access constraints as key obstacles to treatment adherence. Comparative studies in Ethiopia and Uganda confirm similar barriers, highlighting the need for systemic reforms. Morris, Wooding & Grant (2022) argue that integrating traditional healers into referral systems could reduce delays - a recommendation directly supported by informants who expressed hope for healer–hospital collaboration.

Visual Anthropology and Socio-Semiotics

Disability was also represented through visual and symbolic forms. Ritual drawings depicted twisted feet as signs of ancestral displeasure, church sermons framed disability as spiritual warfare and community theatre portrayed children with deformities as moral lessons. These visual narratives reinforced stigma but also provided insight into how disability is culturally encoded. Banks & Morphy (1997) argue that such representations are critical to understanding how societies construct disability. In Cameroon, visual anthropology reveals how cultural signs and symbols shape public attitudes toward clubfoot, extending medical anthropology into socio-semiotic analysis.

Policy and Theoretical Implications

Together, these findings advance Janzen's (1978) concept of medical pluralism by showing how families navigate between indigenous and biomedical systems. They extend Goffman's (1963) stigma theory by demonstrating how stigma undermines not only social identity but also biomedical adherence. They situate Cameroon's realities within global disability rights frameworks (UNCRPD, WHO 2011), showing how local cultural interpretations and systemic barriers challenge the translation of rights-based commitments into practice.

Policy implications include:

- Healer–hospital collaboration to reduce delays.
- Transport subsidies and community-based rehabilitation programs to mitigate systemic barriers.
- National campaigns against stigma to foster social acceptance.
- NGO partnerships to sustain access and advocacy.
- Digital health tools (mobile sensitization campaigns, referral apps, telehealth platforms) to enhance caregiver education and normalize brace use.

Conclusion

Childhood clubfoot in Cameroon emerges as a condition situated at the intersection of medicine, culture and society. This study demonstrates that cultural beliefs, stigma and systemic barriers profoundly shape treatment pathways, often delaying biomedical intervention and undermining the

effectiveness of the Ponseti method. Families interpret deformities through ancestral punishment or witchcraft, while stigma excludes children from education, marriage and community life. Yet, kinship networks, religious institutions and NGOs provide resilience, mediating exclusion and facilitating access to care.

By integrating ethnographic narratives with quantitative outcomes, the study confirms that early initiation of Ponseti treatment yields 92% success, while delays reduce outcomes to 65%. This convergence underscores the need for culturally sensitive interventions that address both medical efficacy and social realities. The findings advance theoretical debates on medical pluralism and stigma, showing how pluralistic health systems and social exclusion intersect to shape disability experiences in Sub-Saharan Africa.

Practically, NGOs play a critical role in bridging systemic gaps, while policy implications extend beyond clinical care: integrating traditional healers into referral systems, subsidizing transport and treatment costs, and aligning disability strategies with UNCRPD principles are essential steps toward inclusive health systems. Community sensitization campaigns and family counselling can further normalize brace use and reduce shame.

In sum, childhood clubfoot in Cameroon exemplifies how effective interventions must combine biomedical efficacy with cultural sensitivity, addressing stigma, leveraging community resilience and reforming systemic barriers. Only through such integrated approaches can children achieve both physical correction and social inclusion, advancing disability rights and health equity in Sub-Saharan Africa.

Limitations and Future Perspectives

Limitations

Despite its contributions, this study has several constraints that must be acknowledged:

- **Geographic scope**: Fieldwork was restricted to the North West and West Regions of Cameroon. While these areas provide rich insights into medical pluralism and stigma, they cannot fully represent the diversity of cultural interpretations and health system dynamics across Cameroon's ten regions.
- **Sampling bias**: Purposive recruitment may have introduced bias, as families willing to participate could differ systematically from those who declined. Families supported by NGOs were more likely to be included, potentially skewing findings toward households with greater access to resources.
- **Temporal constraints**: Longitudinal observation was limited to three months, preventing assessment of long-term social integration and treatment sustainability. Relapse rates and brace compliance beyond this period remain unknown.
- **Self-reported narratives**: Reliance on interviews may reflect social desirability bias, particularly in discussions of stigma and healer practices. Families may have under-reported healer consultations or exaggerated biomedical adherence.
- **Resource constraints**: Limited funding restricted the scale of ethnographic immersion and quantitative analysis. Translation challenges also complicated data

collection, as nuanced meanings in local languages (Pidgin English, Fulfulde, Bamileke dialects) may not have been fully captured.

Nonetheless, triangulation across qualitative and quantitative strands provides a strong foundation for understanding the interplay of cultural beliefs, stigma and biomedical outcomes.

Future Perspectives

Building on these findings, several avenues for future research and intervention emerge:

- **Regional expansion**: Extending research beyond the North West and West Regions to other parts of Cameroon and Sub-Saharan Africa would capture diverse cultural contexts and health system dynamics, ensuring broader applicability of findings.
- **Gendered stigma**: Girls with clubfoot often face compounded barriers in education and marriage, reflecting gendered expectations within communities. Longitudinal research could illuminate how stigma evolves across childhood, adolescence and adulthood, and how gender intersects with disability to shape life trajectories.
- **Longitudinal designs**: Future studies should track treatment outcomes and social integration over time, assessing sustainability of Ponseti success, brace compliance and the long-term impact of NGO and kinship support on disability inclusion.
- **Policy frameworks**: Cameroon's Ministry of Health could formalize healer–hospital collaboration, ensuring timely referrals and reducing delays. Economic

interventions such as transport subsidies and community-based rehabilitation programs could mitigate systemic barriers, while national campaigns against stigma would foster broader social acceptance.

- **Regional lessons**: Uganda's community-based rehabilitation programs, Ghana's disability legislation and Nigeria's NGO advocacy provide models for Cameroon. Comparative policy analysis could identify best practices for integrating cultural sensitivity with systemic reform.
- **Digital health innovations**: Mobile sensitization campaigns, referral apps, and telehealth platforms could enhance caregiver education, streamline referrals, and normalize brace use, particularly in rural areas with limited access to clinics. Pilot projects in Uganda and Kenya suggest that digital tools can reduce delays and improve adherence.
- **Visual anthropology**: Future research should deepen analysis of how disability is represented in local art, ritual, and media. Understanding these socio-semiotic dimensions could inform culturally sensitive campaigns that challenge stigma and reframe disability as resilience rather than punishment.

Closing Arc

By acknowledging limitations and charting future directions, this study situates childhood clubfoot within a broader research and policy agenda. Expanding geographic scope, addressing gendered stigma, adopting longitudinal designs, reforming policy frameworks, and leveraging digital innovations will be critical to advancing disability rights and health equity in Cameroon and beyond.

Abbreviation

CTEV: Congenital Talipes Equinovarus; UNCRPD: United Nations Convention on the Rights of Persons with Disabilities; NGO: Non-governmental organization; NGOs: Non-governmental organizations; COVID-19:

- CO = *Corona*
- VI = *Virus*
- D = *Disease*
- 19 = *2019* (year of discovery)

Thus, COVID-19 = Coronavirus Disease 2019

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Authors' contributions

Koin contributed to the conception and design of the study, acquisition of data with Chongwain, its analysis and interpretation; and in the drafting of the manuscript. Forteh and Tum made thorough revision of the manuscript. All authors read and approved the final manuscript.

Declaration of Conflicting Interests

The authors declared that they have no competing interests.

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