



A co-designed conceptual educational framework for midwives to train Indigenous traditional birth attendants in low resource settings of remote Papua New Guinea

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ABSTRACT

Problem: In remote Papua New Guinea there are few midwives or functioning health facilities, and high perinatal mortality. Indigenous traditional birth attendants carry the burden of caring for women and newborns.

Background: Midwives training and developing traditional birth attendants rely on ad-hoc approaches to the education they provide, drawing from their own knowledge and skills.

Aim: Develop a culturally sensitive conceptual educational framework as a guide for midwives to train and supervise traditional birth attendants in low-resource settings.

Methods: Seven-step approach: 1) Establish trust and respect; 2) Identification of the need; 3) Ethical considerations; 4) Needs analysis; 5) Contextual considerations; 6) Theoretical framework; 7) Practice standards.

Findings: The Yamen Traditional Birth Attendant Conceptual Educational Framework guides midwives to train and supervise traditional birth attendants to strengthen maternal and newborn healthcare in low-resource settings through pre-service education and community development. Four adult, cross-cultural learning principles were identified: cultural sensitivity, strategic issues, previous experience, evidence-based practice. Expected outcomes include increased knowledge, skills, attitudes, and critical thinking of traditional birth attendants.

Discussion: Training and supervision of traditional birth attendants by midwives is recommended for low-resource settings of Papua New Guinea to foster strong partnerships between communities and health facilities and improve perinatal safety.

Conclusion: A co-designed, culturally sensitive education framework is presented with the potential to strengthen maternal and newborn services in low-resource settings by linking traditional birth attendants to midwives in formal health services. Further research is needed to articulate the role, scope of work and key learning competencies.

STATEMENT OF SIGNIFICANCE

Problem or Issue: In the context of Papua New Guinea's low-resource settings, how can midwives train and supervise traditional birth attendants (TBAs) to achieve the greatest impact on maternal and newborn health?

What is Already Known: TBAs are trusted by their community and provide a critical link between formal health services

(midwifery care) and the community. TBAs are effective in sharing knowledge and care to their communities in a culturally acceptable and language appropriate manner.

What this Paper Adds: Description of our approach to the development of a co-designed, evidence-based conceptual educational framework for midwives to train and supervise Indigenous TBAs in low-resource settings of PNG. There is potential for this framework to be applied to other fragile humanitarian settings where TBAs are the only community-based providers of care and

Abbreviations: FGD, Focus Group Discussion; ILR, Integrative Literature Review; PNG, Papua New Guinea; TBA, Traditional Birth Attendant. TBAs are usually women who assist mothers during pregnancy and childbirth, in communities where access to formal healthcare services is limited, relying on traditional knowledge and practices passed down through generations. The term TBA is used when referring to traditional birth attendants in a global sense..

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support to women and newborns.

Introduction

Pregnant women and newborns in Papua New Guinea [PNG] continue to die from preventable causes, especially in rural or remote areas (Kamblijambi and Holroyd, 2017; Robbers et al., 2019; Valley et al., 2016; World Health Organisation 2023). Despite efforts, maternal and newborn mortality reduction targets remain unmet due to complex factors such as geographical isolation, cultural beliefs and taboos, and a lack of infrastructure (Robbers et al., 2019). A significant issue is the lack of midwives who provide accessible care in well-equipped facilities (Andrew et al., 2014; Kamblijambi and Holroyd, 2017; “PNG needs more midwives to reduce maternal mortality: UN”, 2023; Valley et al., 2022). Over 60% of PNG women give birth in villages without support from midwives who, if available, are often based in health facilities some distance away (Kamblijambi and Holroyd, 2017; Valley et al., 2016; National Statistical Office of Papua New Guinea 2019).

Historically, around the world, traditional birth attendants [TBAs] have supported childbearing women especially in low resource settings (David et al., 2025). Defined by WHO (1992) TBAs assist women during pregnancy and childbirth and have acquired skills through experience or learning from others. Trained TBAs have completed a course of up to 4 weeks through formal health care authorities (WHO, 1992). In PNG, TBAs are known as village birth attendants (Andrew et al., 2014; Kamblijambi and Holroyd, 2017).

In 1999 the Safe Motherhood Initiative announced that training TBAs alone without the support and back-up of formal health services was not effective in reducing maternal mortality (WHO, 1999). Unfortunately, since then, globally, TBAs have been excluded from training, blamed for maternal deaths and even outlawed in some countries (David et al., 2025; Garces et al., 2019; Haruna et al., 2019; Janti, 2020). In adherence to this international policy, national health authorities in PNG have excluded TBAs from training and support (Kamblijambi and Holroyd, 2017; Tlozek, 2016). Despite the WHO Millennium Development Goals, PNG is one of the few countries where the maternal mortality ratio has risen, estimated between 400–730 deaths per 100,000 livebirths, higher in remote areas where there are few to no government services, and a significant lack of skilled midwives (Andrew et al., 2014; Mola and Kirby, 2013; Robbers et al., 2019; Valley et al., 2022). Due to the government’s stance in PNG, public discussion about TBAs in remote areas has been avoided, but in private, many midwives acquainted with the challenges of accessing health in rural areas, advocate strongly for their role and training (PNG Midwifery Community of Practise social media group, personal communication, 2022). In the global context there is growing support for TBAs in fragile and humanitarian areas to be integrated into formal health services and for midwives to lead their training, support and supervision (David et al., 2025; Dey et al., 2024; Haruna et al., 2019).

In PNG, one initiative to address this ongoing and pressing need within the gap of remote maternal and newborn health services, is to co-create an appropriate training program for TBAs informed by local needs and based on sound educational approaches. This paper details the co-design approach used to create an educational framework, called the Yamen Traditional Birth Attendant Conceptual Educational Framework. This framework can be used as a guide for midwives to train and supervise TBAs, linking them to formal healthcare services with the aim of strengthening the overall maternal and newborn service system in rural and remote PNG, with potential application to other fragile and humanitarian settings around the globe. This discussion paper addresses current gaps in the trajectory of healthcare for women and newborns in low resource settings of PNG and is based on the primary author’s Master of Philosophy research findings.

The steps taken during the co-design approach are described, a

summary provided of the key components of the culturally appropriate training program, inclusive of recommended content, training methods and resources, and approaches for assessment and evaluation.

Since 2012, the primary author has volunteered as a midwife, training and supporting TBAs in East Sepik Province, PNG through the charity she founded, Living Child Inc. (www.livingchildinc.org.au). The Master’s research arose from requests by TBAs, community leaders and the East Sepik Provincial Health Authority to develop a suitable training framework and educational manual for TBAs to enhance maternal and newborn healthcare by linking them with midwives in formal government services (David et al., 2025; David, 2024).

Methods

A seven-step approach informed the co-designed educational framework, serving as an evidence-based guide for trainers (usually midwives), and training of, TBAs in low-resource settings of PNG: Step 1) Establish trust and respect, Step 2) Identification of the need, Step 3) Ethical considerations, Step 4) Needs analysis, Step 5) Contextual considerations, Step 6) Theoretical framework and Step 7) Practice standards (see Fig. 1 below). Each step will now be discussed in detail.

Step 1. Establish trust and respect: In 2012, male church leaders invited the primary author to the remote villages of Keram River, Angoram District, East Sepik Province, PNG where the Indigenous Waran and Apsa people live (Fig. 2), to train TBAs due to high maternal and newborn mortality rates and a stated lack of government services. In response, Living Child Inc. was founded in partnership with local churches. Over the first decade, key outcomes of the charity included building local capacity by enhancing TBAs’ skills and knowledge, providing clean birth kits, and upskilling midwives in remote facilities to manage TBA referrals. The principal author also synthesized and represented community needs and concerns to health authorities, addressed women’s contraceptive needs, and provided access to contraceptive implants, training local nurses and midwives to continue this service (Allan et al., 2023; David et al., 2019). Through prolonged engagement, significant trust and respect developed between the principal author and the remote communities, an essential element in moving forward.

The people in these communities experience significant social, economic, health and educational disadvantage with low literacy and numeracy proficiency levels, yet they were resilient and culturally strong. Cultural awareness was developed by spending time with the men and women, listening to their stories, learning their language of Tok Pisin, and understanding their cultural history, values, mores and experience of colonisation. This helped the principal author to check their colonial expectations and beliefs. The TBAs gained confidence from the interactions with the principal author and the knowledge and skills learned from the education sessions provided by Living Child Inc. The TBAs also benefitted from subsequently receiving greater support from local government health services through engagement with local midwives and closer supervision of health facilities by authorities.

Step 2. Identification of the need: After many years of engagement with TBAs, community members, and leaders in East Sepik Province, the TBAs requested a training manual as an adjunct to help with knowledge retention of skills they had learned through previous education sessions. Simultaneously, East Sepik Provincial Health Authority, who recognised the essential role of volunteer TBAs in the expansive remote areas, also asked Living Child Inc. to provide training. This created an opportunity to formally evaluate training of TBAs in rural and remote areas with the intent to better understand learner needs, plan and deliver impactful and lasting educational approaches for the local context.

Step 3. Ethical considerations: Specific considerations are required when engaging with remote Indigenous communities, where respect of culture, language and practices need to be central prior to any work being undertaken. Leveraging off the established rapport with the communities, leaders and local government authorities, specific risk assessments were addressed within the application for ethics approval

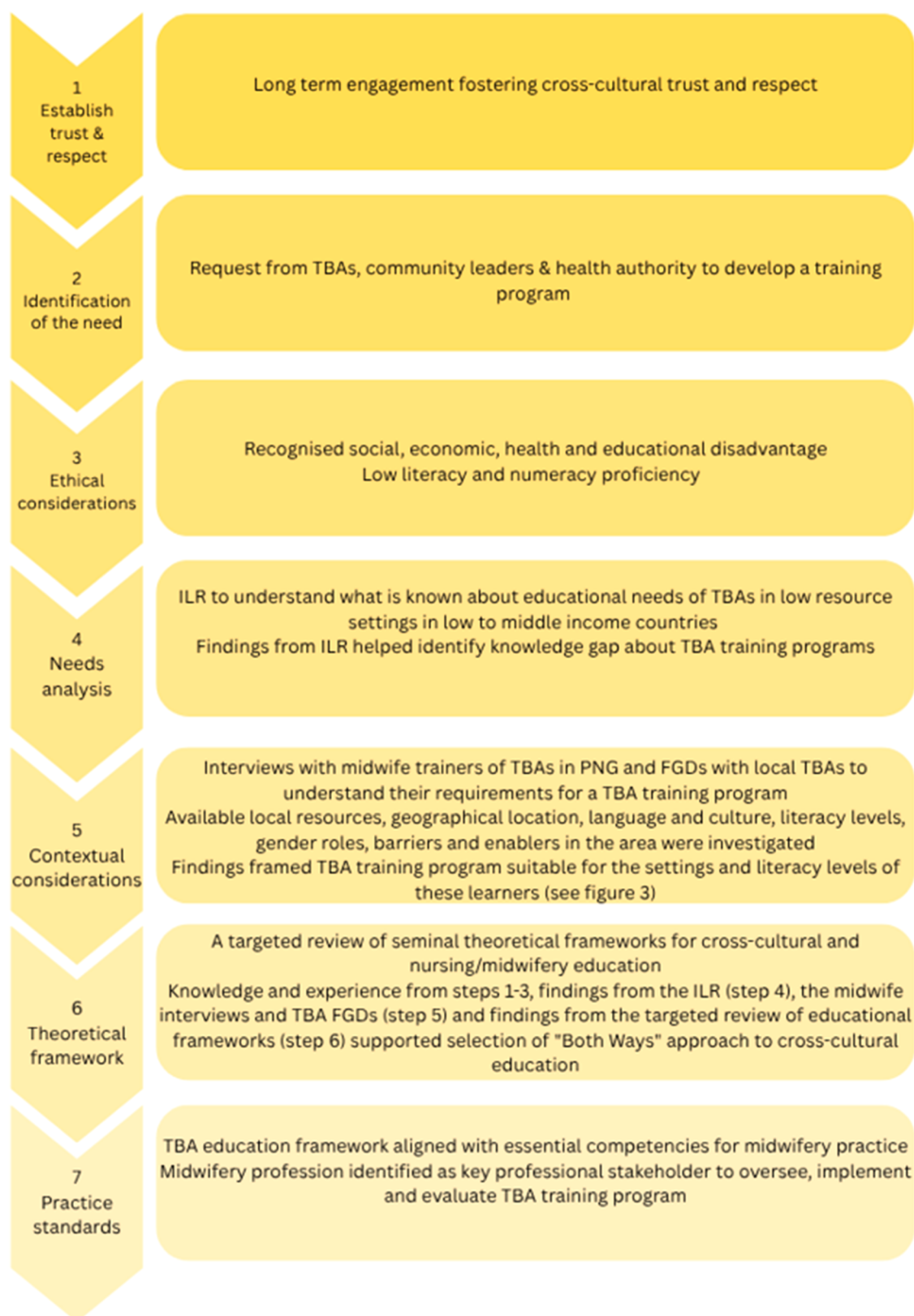


Fig. 1. Seven step approach to the development of a conceptual educational framework.

which was obtained from an Australian university Human Research Ethics Committee and the Medical Research Approval Committee in PNG. TBAs, local leaders and midwives provided input and ideas which shaped the developing educational materials for the TBA training

program. In addition, an internal review group of East Sepik nursing and midwifery leaders was established to provide advice and cultural support to the principal author. A key aim identified by the internal review group was building capacity within the East Sepik Provincial Health

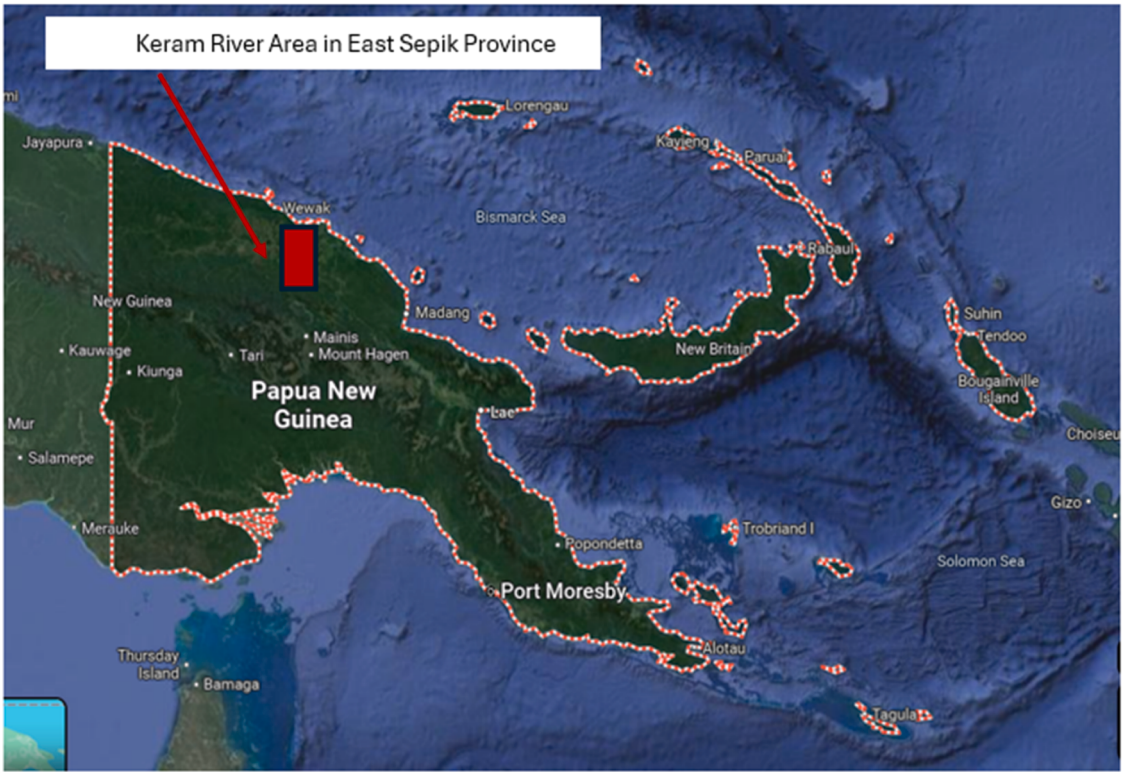


Fig. 2. Map of PNG showing location of Keram River area. Credit: Google Maps.

Table 1
A summary of findings from midwife interviews and TBA FGDs.

Themes and subthemes from midwives' interviews
Building Trust and Respect
Addressing Local Needs
Supervision and Support
Giving TBAs and local people a voice
Teaching Content
Essential Information to Save Lives
Public Health Promotion
Overcoming Barriers to Care
Partnership with Health Facility
Teaching Methods
Targeted to Culture & Place
Interactive Teaching
Strategic Planning for the Future
Teaching Resources
Locally Contextualised
Commercially or locally developed resources
Global Case Studies
Themes and subthemes from TBA focus groups
Role and Motivation
Saving lives – 'If I don't, who will?'
Serving community and God
'There are no health services'
Challenges and Fears
Health systems and logistics
Support and supervision
Culture and shame
Training Content
Community education to improve and save lives
TBA skills to save lives
Teaching Methods and Resources
Interactive methods
Supervised simulation practice
Basic tools and equipment for practice

Authority nursing and midwifery leadership.

Step 4. Needs Analysis: An Integrated Literature Review [ILR] was conducted with the aim of understanding what is known about the educational needs of TBAs in low resource settings in low to middle income countries (David et al., 2025). Findings from this review helped identify the gap in knowledge about training TBAs, provided context for developing training programs for TBAs and helped frame the research question for step 5. Findings highlighted a lack of consensus on the role, naming conventions and scope of TBA practice globally, and opinions varied on the type of teaching content, training duration, and expected outcomes for TBA training programs (David et al., 2025). However, it was acknowledged that TBAs play a crucial community-based role in maternal and newborn healthcare in low-resource settings, where access to midwives is limited or difficult to reach.

Step 5. Contextual considerations: To determine the specific requirements for a TBA training program in remote PNG, the available resources, geographical location, language and culture, literacy levels, gender roles, barriers and enablers in the area were investigated.

In November 2021, sixteen TBAs from two remote locations in East Sepik Province, PNG, and ten midwives who had taught TBAs, including three local PNG midwives, shared their lived experiences on teaching content, training methods and resources (see a summary of the findings in Table 1 below). Midwives and TBAs highlighted their essential contributions in providing maternity care where no other options existed. They emphasised the challenges of poverty, lack of infrastructure, low literacy proficiency, a fragmented health workforce, and strong cultural practices (David, 2024). Key considerations for such programs focused on “saving lives of mothers and babies,” which should include

preparation for emergency or uncertain birthing situations, TBA role and scope of practice within formal maternal and newborn health services, public health education, and where warranted, development of the whole community with particular focus on reproductive and sexual health education (David, 2024). Teaching methods and resources were recommended to be co-developed, interactive, culturally and linguistically appropriate for individuals with low literacy levels. Visual aids like videos, flipcharts and basic anatomic-like models for simulation were identified as valuable tools for education, training, and assessment (David, 2024). This input helped frame the outline for a TBA training program suitable for the settings and literacy levels of these learners (Fig. 3).

A systematic, competency-based approach to learning and assessment was suggested where specific topics, once learned and practiced, could be assessed for ‘competency’. The teaching content was identified by midwifery trainers and TBA trainees to address local issues and strategic goals of saving lives by overcoming healthcare access challenges. Certificates of program completion were suggested for formal acknowledgement of training attendance and competency achievement. Ongoing support and supervision by midwives were recognised as essential for the sustainability of any training program (David, 2024; Hernandez et al., 2018; Roberts and Anderson, 2021).

Step 6. Theoretical framework: In light of the extensive array of educational theoretical frameworks, a targeted search for frameworks appropriate for the context was undertaken. Search terms included *pre-service curriculum*, *cross-cultural education*, *theoretical frameworks for teaching low-literacy adults*, and *health in low-resource settings*, and revealed several seminal frameworks for pre-service midwifery

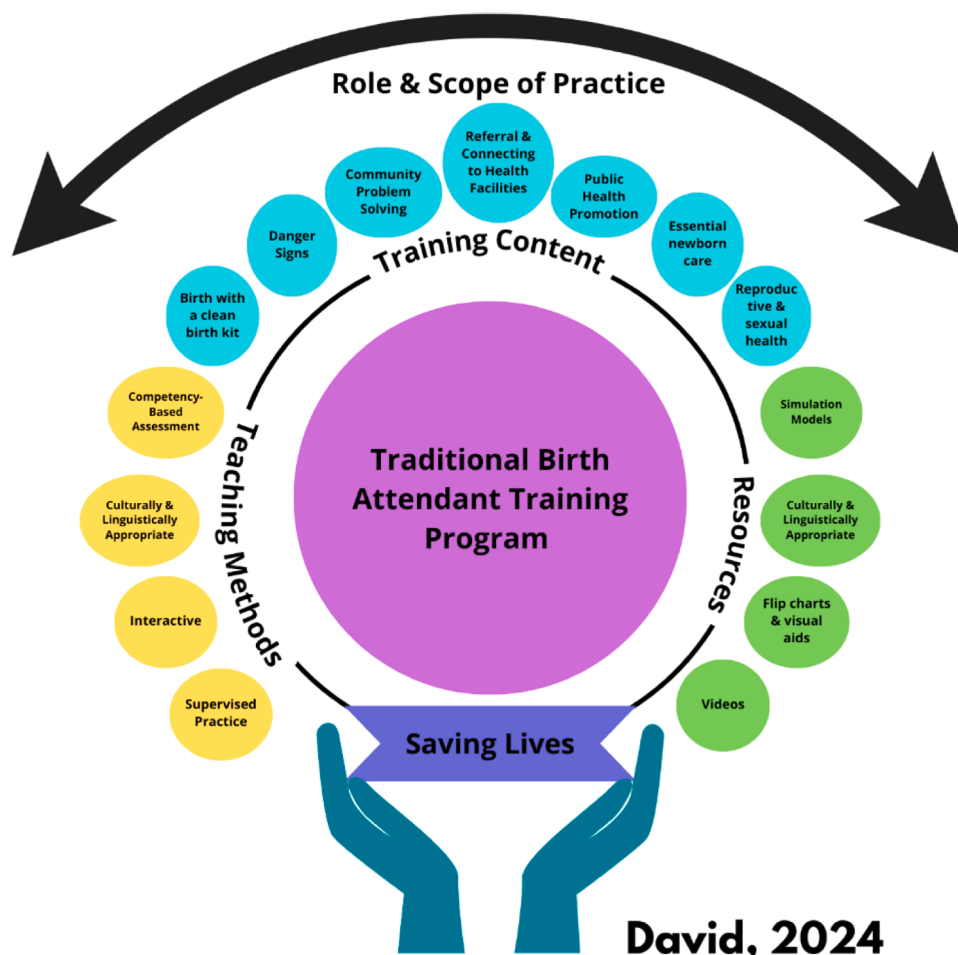


Fig. 3. Traditional birth attendant training program outline (David, 2024).

education programs. These included the *behaviour change theoretical framework* (Akin-Otiko and Bhengu, 2013; Fishbein and Capella, 2006; Shrestha et al., 2013); *adult learning* (Ameh et al., 2016), *knowledge to action translational framework* (Faucher et al., 2016) and *a mastery approach to learning* (Mirkuzie et al., 2014).

More recently, terms such as co-production, co-design and co-creation have gained prominence in nursing education, offering opportunities for stakeholder input and ‘ownership’ to maximise meaning and relevance (Grindell et al., 2022; Manohar et al., 2016; O’Connor, et al., 2021). Co-designing enhances educational impact, program longevity, knowledge uptake and stakeholder investment, ensuring the program remains culturally sensitive. Background knowledge-mobilisation involves gathering information from various stakeholders and sources, then generating, sharing, and using evidence to create a curriculum or education program through creative evaluation (Grindell, et al., 2022; Manohar et al., 2016; O’Connor, et al., 2021). This co-design journey ensures appropriate and relevant education and training, leading to better knowledge retention and practice transfer, ultimately improving outcomes (Grindell, et al., 2022; Manohar et al., 2016; O’Connor et al., 2021).

Frameworks suitable for Indigenous low resource settings include *culturally responsive-sustaining education*, co-designed by community members and participants, ensuring equal access to the program (Education Dive, 2020). *Culturally responsive-sustaining education* is applied cross-culturally to achieve educational outcomes at the community’s pace, based on their cultural identity (Education Dive, 2020). A *Strength-based approach* to community development is often referenced in international aid and development literature, especially when working with disadvantaged communities (Willett et al., 2014). This approach focuses on leveraging community strengths rather than immediate needs, partnering with, and building capacity in areas of existing strength (Willett et al., 2014). Slowly building connections with a community, considering their unique cultural influences, helps educators understand and support communities, closing gaps in knowledge and behaviours.

Both-ways is a co-design philosophical approach to Indigenous learning developed in the Northern Territory of Australia to foster self-determination within remote Aboriginal communities (Bat and Fasoli, 2013). The culturally appropriate and sensitive training program aimed to improve literacy through a community-based, multi-stakeholder and collaborative approach, combining Indigenous education and competency-based training (Bat and Fasoli, 2013). *Both-ways* integrates Indigenous and Western educational perspectives (depicted as a double helix or intertwined twisted ladder) to empower Indigenous peoples with knowledge and skills while strengthening their identity. Western evidence-based knowledge is combined with Indigenous traditions to reflect current realities. The *both-ways* approach, to engage in a collaborative learning journey with trainers and supporters, strengthens the identity of Aboriginal and Torres Strait Islander peoples, builds their social and cultural knowledge, and can lead to formal qualifications (Bat and Fasoli, 2013).

Reflective practice, involving continuous questioning during the learning journey is a key component of the *both-ways* curriculum (Bat and Fasoli, 2013) and is well known in nursing and midwifery disciplines. Reflection can be done individually or as a team, critically analysing healthcare practice issues to gain understanding, new knowledge and ultimately, enhance care (Fleming, 2007; Schön, 1995; 1987). The *Area of Common Ground* (a ‘cross-bridge’ between the strands of the double helix) follows reflecting on different perspectives and viewpoints. The *both-ways* approach respects the local culture and beliefs of the Indigenous community, creatively finding common ground for learners to understand Western knowledge and vice versa. This approach empowers communities with a strengthened identity and more thoughtful engagement with formal health services based on biomedical models of care (Bat and Fasoli, 2013).

Knowledge and experience from steps 1–3, in addition to findings

from the ILR (step 4), the midwife interviews and TBA FGDs (step 5) and findings from the targeted review of theoretical educational frameworks (step 6) were all considered when selecting the philosophical approach to imbed within the educational framework. *Both-ways* is the theoretical framework that aligned closely with this study’s collective narrative, making it ideal for underpinning the development of a TBA educational framework.

Step 7. Practice standards: The community-based role and scope of practice of TBAs reflects traditional midwifery work, and the International Confederation of Midwives [ICM] *Essential Competencies for Midwifery Practice* have been cited as informing training programs for TBAs (David, 2024; David et al., 2025; ICM, 2019). Therefore, the essential standards of midwifery have been selected to inform the educational framework for TBAs. A *Competency-based framework* provides assessment tools for workplace ready qualifications and is the approach to learning and assessment promoted by the ICM. The ICM *Essential Competencies for Midwifery Practice* include basic levels of knowledge, skills and professional behaviours that are minimum requirement for midwives (ICM, 2019). Although the ICM competencies are beyond the scope and education level of TBAs, they provide a guiding scaffolding to develop appropriate competencies for TBA practice.

Results

The Yamen traditional birth attendant conceptual educational framework for low-resource settings in PNG

Drawing on the literature and educational frameworks, the Yamen TBA Conceptual Educational Framework (Fig. 4) was created. This framework takes account of key points discussed earlier and strategically guides trainers of TBAs (usually midwives) on recommended teaching content, training methods and resources as outlined in Fig. 3. The framework is named after *Yamen*, a remote village in East Sepik Province, PNG, where significant connections with women and TBAs were developed. The named framework acknowledges the resilience and perseverance of the village in saving lives of women and children in their village and surrounding communities.

The *both-ways* philosophical approach was chosen for the Yamen TBA Conceptual Educational Framework, acknowledging and respecting traditional Indigenous knowledge while incorporating Western evidence-based knowledge. This approach finds common ground to build knowledge, skills and attitudes, and critical thinking in TBA



Fig. 4. Yamen TBA conceptual educational framework (David, 2024).

trainees. The principles of *adult learning* and *competency-based learning and assessment* underpin the framework, making it adaptable to a low-literacy community with the potential to improve literacy skills (Bat and Fasoli, 2013; Knowles, 1978; Mirkuzie et al., 2014).

The core of the Yamen TBA Conceptual Educational Framework (Fig. 4) is saving lives of women and newborns by improving the *quality of maternal and newborn care* provided by TBAs, however, the focus extends to the entire community. Enfolded in this core focus is *pre-service education and community development*, which identifies the community's strengths, their role in decision-making of pre-service healthcare, and their involvement in addressing challenges in accessing health services. This education framework recognises that women and children live within a community context.

Four key adult and cross-cultural learning principles form the next layer of the framework, influenced by the 'both-ways' philosophy and *culturally responsive-sustaining education*:

1. **Cultural sensitivity:** Acknowledging and incorporating local Indigenous knowledge into learning.
2. **Strategic issues:** Co-designing the program with the community to address local issues according to their priorities and needs.
3. **Previous experience:** Building upon previous formal and informal learning, regardless of perceived low literacy proficiency in the community.
4. **Evidence-based practice:** Incorporating important knowledge and experience to minimise harm, build trust and identity, and stimulate inquiry.

The intended outcomes of the education program form the next layer and extend beyond the trainees to the broader community. Enhancing or building knowledge, skills, and attitudes should contribute to improved quality of reproductive and sexual healthcare by TBAs through linking them to formal health services. Incorporating the community within the framework acknowledges their contributions towards making informed decisions, thinking critically through issues to solve problems effectively, especially regarding accessing skilled midwifery care. Educational interventions, including detailing learning objectives, theoretical content, and delivery methods, are core components of a training program and should be co-designed with the community and stakeholders to ensure suitability, applicability, and sustainability. Acknowledging cultural knowledge is key to developing respectful, trusting relationships with the community and ensuring positive behavioural change through evidence-based health practices.

Competency-based learning and assessment that are culturally and linguistically appropriate build confidence and identity in trainees. The ICM *Essential Competencies for Midwifery Practice* can serve as a guide. This approach supports the mission of the training program, for TBAs to be connected to formal maternal and newborn health services, acting as and formalising their linking role between village communities and midwives in health facilities.

Discussion

The Yamen TBA Conceptual Educational Framework offers an evidence-based guide for midwives who train and supervise TBAs, to strengthen maternal and newborn healthcare systems in low resource settings of remote PNG. The framework provides a structure wherein training programs can be designed to ensure that TBAs consistently acquire essential skills and knowledge in a systematic manner and are trained and supervised by midwives who link them with formal healthcare services. Practical skills, such as safe birthing practices, newborn care, and appropriate and timely responses to emergency situations, crucial in low-resource settings, can be improved by focusing on specific TBA competencies within a training program (David et al., 2025). Improved competencies through well supported learning initiatives generally lead to higher quality maternal and newborn care,

reducing complications and improving health outcomes (ICM, 2019; Roberts and Anderson, 2021). Regular assessments of competency would ensure that TBAs provide best possible care in their respective contexts, which would continue to positively contribute to maternal and newborn health in their communities (David et al., 2025). Recognition and respect of TBAs within their communities and from midwives and fostering better collaboration between these groups is a potential benefit of a systematic training framework (Dey et al., 2024). Competencies can be adapted to fit the local context and cultural practices, making the training more relevant and effective, also improving trust between the remote communities and formal healthcare providers (David et al., 2025).

Implementing the Yamen TBA Conceptual Educational Framework can present several challenges due to the remote location of communities in PNG. Limited access to training materials, facilities and qualified midwifery trainers willing or able to travel to remote locations may hinder the effective delivery of the program. Therefore, integrating a TBA training and supervision program within local health systems, facilitated ideally by midwives is a key recommendation for sustainability (David et al., 2025). Balancing traditional Indigenous knowledge with Western evidence-based practices requires careful navigation and support to ensure respect and acceptance by the community. TBAs and communities who have relied on traditional practices for years may be resistant to, or suspicious of, adopting new methods and frameworks, therefore ensuring active participation and buy-in from the community and stakeholders is crucial to success (David et al., 2025; David, 2024). Sensitivity to diverse cultural practices and beliefs, maintaining ongoing support and training for TBAs to ensure their skills remain current and effective, are some suggestions to navigate the challenges in rural remote PNG.

Addressing these challenges requires a collaborative approach that respects cultural practices, provides accessible training and supervision of TBAs by midwives, and fosters strong connections between communities and health facilities. The authors recommend that midwives are the best placed professionals to lead and facilitate this collaborative approach.

Conclusion

Growing calls from midwives working in remote locations in PNG and fragile humanitarian settings around the world, means that the time has come to address the issue of training TBAs. There are several approaches favoured by educators from different disciplines to train cross-cultural communities in low-resource settings with low levels of literacy proficiency. Following a targeted review of the literature, including the findings from the lived experience of TBAs and midwife trainers in remote PNG, a conceptual educational framework for community-based Indigenous traditional birth attendants in low-resource settings of PNG has been described. The Yamen TBA Conceptual Educational Framework serves as a strategic guide for midwives to train and supervise TBAs, enhancing their knowledge, skills and competency. The framework aims to scaffold approaches to TBA training and supervision to empower TBAs to increase their capability to improve perinatal outcomes in their communities. Importantly, it facilitates their connection to midwives in formal health services, potentially alleviating the burden of responsibility for poor perinatal outcomes in remote communities. Trainers of TBAs will be empowered as the framework offers clear direction to address sustainable avenues to improving reproductive and sexual health outcomes in remote settings in PNG and offers a strategic pathway to build capacity for strengthening maternal and newborn healthcare in resource restricted areas.

Further research is required to articulate the role, scope of work and key competencies necessary for TBAs, and to evaluate the implementation of this educational framework.

Ethics approval

Curtin University Human Research Ethics Committee (HRE2020-0709) and the Medical Research Approval Committee in PNG (MRAC#20.14)

Consent for publication

Consent from all authors obtained for publication to Midwifery

Availability of data and materials

data available in Table 1 and Fig. 1,2& 3.

CRediT authorship contribution statement

Sara David: Writing – original draft, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Michelle A Kelly:** Writing – review & editing, Validation, Supervision, Formal analysis, Conceptualization. **Yvonne Hauck:** Writing – review & editing, Validation, Supervision, Formal analysis. **Zoe Bradfield:** Writing – review & editing, Validation, Supervision, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

No conflicts of interest to declare.

Funding

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