Saudi Journal of Medicine and Public Health

https://saudijmph.com/index.php/pub

https://doi.org/10.64483/jmph-112

Evaluating the Cost-Effectiveness and Long-Term Impact of Community-Based First Aid (CBFA) Programs: A Comprehensive Review

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Abstract

Background: Community-Based First Aid (CBFA) programs educate laypeople to respond to emergencies, addressing pressing gaps in pre-hospital care, particularly in resource-scarce settings. Their cost-effectiveness and long-term impact are under-researched despite growing adoption globally.

Aim: This review evaluates the cost-effectiveness and enduring impact of CBFA programs, identifying barriers and facilitators to inform scalable implementation approaches.

Methods: Peer-reviewed studies (2000-2025) from PubMed, Scopus, Web of Science, and grey literature were synthesized narratively. Inclusion criteria were peer-reviewed and grey literature that reported on CBFA effectiveness, costs, or long-term outcomes in any setting. Data were extracted for study design, population, interventions, and outcomes (e.g., ICERs, skill retention), and quality was assessed using GRADE and Cochrane tools.

Results: CBFA programs are very cost-effective, with ICERs < $500/QALY and benefit-cost ratios as high as 4.2:1. Long-term studies report sustained benefits, including 20-25% reductions in injury hospitalizations and 15-20% improvements in helping behaviors up to 3 years post-training. Challenges: skill decay (20-30% within 6-12 months) and limited funding. Electronic resources and CHW integration support scalability.

Conclusion: CBFA programs are a cost-effective, equitable emergency preparedness intervention, supporting SDG 3. Policymakers need to prioritize digital integration and strict evaluations for maximal effect.

Keywords: Community-Based First Aid, cost-effectiveness, long-term effect, skill retention, emergency preparedness.

1. Introduction

The growing frequency of emergencies—from natural disasters to cardiac arrest and traumatic injury—underscores the need for available, community-based interventions. Community-Based First Aid (CBFA) programs empower laypersons, including community members, volunteers, and CHWs, to apply immediate life-saving interventions before the arrival of professional emergency services. The programs typically involve short-course training (3-18 hours) in skills such as cardiopulmonary resuscitation (CPR), bleeding control, immobilization of fractures, and recognition of medical emergencies like stroke or anaphylaxis (Agustini, 2021). CBFA initiatives are particularly vital in low- and middle-income countries (LMICs), where emergency medical systems (EMS) are often underdeveloped, leaving a critical gap in pre-hospital care (World Health Organization, 2024).

The value of CBFA lies in its dual impact: immediate life-saving potential and long-term community resilience. For example, bystander CPR can increase cardiac arrest survival rates by 2-3 times (Anderson et al., 2011). Within disaster-risk zones, individuals trained through CBFA reduce injury severity and ease pressure on overburdened health systems (Fatoni et al., 2022). Despite these benefits, there remain few detailed evaluations of CBFA's cost-effectiveness and its impact in the long term. Economic analyses are needed for the resource expenditure justification, especially in LMICs where budgets are constrained (Kok et al., 2015). Likewise, longitudinal research is necessary to respond to worries regarding skill decay, which is a prevalent problem in conventional first aid training (VanderBurgh et al., 2014).

The purpose of this review is to bridge these gaps through synthesizing evidence from varied global settings, such as rural Vietnam, urban Kinshasa, and high-income countries such as the United States and Europe. The objectives are to: (1) evaluate the cost-effectiveness of CBFA through cost-effectiveness analyses (CEAs) and cost-benefit analyses (CBAs); (2) establish long-term outcomes, including skill retention, behavior change, and health system impacts; and (3) establish barriers and facilitators for the scale-up of CBFA programs. By focusing on these areas, the review informs evidence-based strategies for enhancing global emergency preparedness.

Methodology

This narrative review follows the PRISMA guidelines adapted for scoping synthesis, covering community-based first aid (CBFA) research from January 2000 to October 2025. A literature search

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Receive Date: 15 Sep 2025, Revise Date: 25 Sep 2025, Accept Date: 8 October 2025

across PubMed, Scopus, Web of Science, and grey literature was conducted, yielding 1,200 records, reduced to 150 articles, and finally including 40 eligible studies after screening. Eligibility criteria favored peer-reviewed articles assessing CBFA programs regarding effectiveness, costs, and long-term impacts, while excluding non-empirical studies and irrelevant interventions. Data were extracted on study design, population, intervention characteristics, and outcomes, using GRADE for quality assessment. Findings were synthesized into themes: effectiveness, cost-effectiveness, and long-term effects, with limitations noted for publication bias, heterogeneity in definitions, and cost variability. Quantitative results were tabulated for clarity, and sensitivity analyses were conducted for robustness evaluation.

Defining Community-Based First Aid (CBFA) Programs

Community-Based First Aid (CBFA) programs are a new emergency preparedness approach by educates non-professional people, such as members of a community, volunteers, teachers, and community health workers (CHWs), to equip them with the ability to respond effectively and rapidly to medical and psychological emergencies. Unlike traditional first aid training, which is typically offered in institutional or clinical settings and targets health professionals, CBFA programs are community-centered, decentralized, and designed to reach diverse groups of people, including those in low-resource areas (World Health Organization, 2024). These programs prioritize cultural appropriateness, peer instruction, and connection with local health systems so that laypersons can bridge the lifesaving interval between the time an emergency strikes and the arrival of professional EMS (Agustini, 2021). This golden hour of emergency medicine, or window of opportunity, is crucial to maximize survival and reduce morbidity, particularly in regions with limited access to formal health care infrastructure.

The CBFA programs' hallmark is adaptability to the local context, so that training is not only practical but also culturally appropriate. For example, in rural and remote areas of low- and middle-income countries (LMICs), CBFA programs are tailored to deal with prevalent emergencies such as trauma from road traffic accidents or natural disasters, while in high-income countries, they encompass occupational injuries or cardiac arrests (Fatoni et al., 2022). By utilizing community-based venues like schools, churches, or community centers, CBFA programs reduce attendance barriers, such as transportation costs or time constraints, thereby rendering them more accessible to greater numbers of people, inclusive of disadvantaged groups like women, older adults, and low-literacy populations (Mardialina et al., 2024). Figure 1 represents the structure and flow of CBFA programs from community engagement to emergency response and outcomes.

Figure 1. Framework of Community-Based First Aid (CBFA) Program Implementation

Core Components of CBFA Programs

Community-Based First Aid (CBFA) programs are structured to empower laypersons to respond effectively to emergencies through four core components: emergency recognition, basic interventions, referral pathways, and psychological first aid (PFA). Emergency recognition trains participants to identify life-threatening conditions like cardiac arrest, stroke, severe bleeding, or anaphylaxis, enabling timely action that can significantly improve outcomes, such as doubling or tripling survival rates for cardiac arrest with prompt CPR (Anderson et al., 2011). Basic interventions focus on practical, equipment-light skills like CPR, bleeding control via direct pressure or tourniquets, fracture stabilization with improvised splints, and choking relief through the Heimlich maneuver, which are critical in areas with delayed EMS response (Sayre et al., 2008). For example, in rural Vietnam, CBFA-trained individuals reduced bleeding-related mortality by 20% through timely tourniquet use (Huy et al., 2022).

Referral pathways ensure that victims are connected to formal healthcare systems, with trainees learning to communicate critical details to EMS and navigate local health infrastructure, a vital component in LMICs with fragmented systems (Diango et al., 2023). In Kinshasa, the WHO's Community First Aid Responder program reduced transport delays by 15% by training CHWs to coordinate with clinics. Additionally, PFA addresses emotional distress by providing non-judgmental support and coping strategies, often integrated with Mental Health First Aid frameworks to reduce stigma and facilitate referrals (Kitchener & Jorm, 2008). In post-disaster Pacific Island settings, PFA components in CBFA programs improved community morale and reduced anxiety-related emergency visits by 10% (Agustini, 2021).

Program Design and Contextual Variations

The design of CBFA programs varies significantly across settings to address local needs and resources. In LMICs, initiatives like WHO's Community First Aid Responder (CFAR) program

target CHWs in rural or disaster-vulnerable areas, via intensive 3- to 5-day courses with didactic training combined with hands-on simulation. Programs are focused on high-impact emergencies, such as trauma from floods or earthquakes, and are often taught in regional languages to further enhance accessibility (Fatoni et al., 2022). For example, in Haiti, CHWs trained by CFAR reduced trauma mortality by 15% by stabilizing victims during the golden pre-hospital time (Fatoni et al., 2022).

In high-income countries, CBFA courses are shorter in length (3-8 hours) and are directed towards special groups, e.g., schoolteachers, workplace employees, or community volunteers. They are prone to be structured around common emergencies like cardiac arrest or workplace injuries and are instructed in handy locations like schools or recreational centers (Bánfai et al., 2018). Delivery modes also vary, ranging from fully face-to-face teaching to blended models that combine online content with simulation practice. Blended learning has gained popularity because of its flexibility to allow learners to complete theoretical components at their own pace before they attend face-to-face practical sessions (Reavley et al., 2021). One study in Australia found that the implementation of blended CBFA training enhanced the completion rate by 20% compared to traditional face-to-face delivery methods (Reavley et al., 2021).

Cultural and Equity Considerations

Cultural tailoring is a cornerstone of effective CBFA programs, rendering training applicable to indigenous values and breaking down participation barriers. For instance, a Vietnamese island CBFA program had materials translated into local dialects, resulting in a 30% uptake and engagement rise among learners (Huy et al., 2022). Similarly, gender-sensitive interventions in South Asia, such as female trainers and women-only training groups, increased women's participation by 25% to work against cultural norms disapproving of mixed-gender interaction (Mardialina et al., 2024). Such adaptations are particularly crucial in LMICs, where literacy levels, gender roles, and cultural beliefs can affect program success.

For all their strengths, CBFA programs also face significant challenges. High drop-out rates, up to 40% for some programs, are most often the result of time pressures, lack of sufficient incentives, or perceived irrelevance of content (Smith et al., 2016). Skill decay is also a factor, with studies demonstrating that without booster sessions every 6-12 months, up to 30% of acquired skills are lost after one year (Smith et al., 2016). To counteract these issues, retention strategies such as reminders via mobile apps or peer mentoring groups, which have been shown to increase retention by 15% (Reavley et al., 2021), are implemented in some programs.

CBFA Program Effectiveness

The efficacy of CBFA programs is strongly documented in various settings, populations, and types of emergencies. Research consistently shows gains in knowledge, skill, confidence, and community resilience, although outcomes differ by population and context. CBFA courses are very successful at enhancing the ability of participants to identify and respond in emergencies. A pilot RCT with teachers in early childhood education in Spain (n=13) demonstrated robust pre-post knowledge gain, with test scores increasing from 60% to 85% on average ($p<0.001$). In simulated practice, 80% of participants were proficient in choking and minor trauma scenarios, demonstrating the direct impact of targeted training (García-Blaya et al., 2025). Similarly, the WHO's CFAR program in Kinshasa, Democratic Republic of Congo, trained 42 CHWs, which resulted in a dramatic self-efficacy increase from 17.9% to 95.3% ($p<0.001$). Notably, 94.7% of respondents rated the content of training as being of high relevance to their community needs, reflecting the program's responsiveness to the local health concerns (Diango et al., 2023).

Meta-analyses illustrate CBFA's broader impact. A systematic review of 25 trials of MHFA programs published in PLOS One found moderate effect sizes (Morgan et al., 2018; Cohen's d=0.56) for outcomes such as recognition of mental health crises (panic attack, suicidal ideation, for example) and responding with suitable help. For physical first aid, a BMC Vietnam survey of 39 primary care providers demonstrated 25% skills improvement in areas like CPR and wound care following training, with effects sustained at 6 months (Kosowicz et al., 2023). Nonresuscitative skills like bleeding control have been particularly effective, reducing simulated injury severity by 40% in controlled settings (Sayre et al., 2008). These findings underscore CBFA's ability to impart measurable increases in technical and psychological emergency response skills.

The effectiveness of the CBFA program varies by population according to age, literacy, culture, and the structure of training. In China, a trial involving 200 elderly individuals showed a 30% increase in first aid proficiency, including CPR and fracture immobilization, following a 4-hour CBFA course. However, low literacy levels hindered complete uptake, since 25% of respondents struggled to recall complex protocols (Yin et al., 2023). In contrast, interventions targeting young people have been very successful. A single intervention in Norwegian kindergartens demonstrated that children aged 5-6 years improved their ability to recognize emergencies (i.e., calling for help) by 50%, though long-term memory depended on parental support (Bollig et al., 2009). This underscores the need for matching content to developmental phases and engaging family members to maintain results.

In settings prone to disasters, CBFA programs have enhanced community resilience. The Disaster Response and First Aid (DRAFA) program

on the Pacific island of Saipan, which is exposed to typhoons, trained 150 community members and yielded a 35% enhancement in resilience measures, such as quicker evacuation times and improved coordination with EMS in simulations (Agustini, 2021). Likewise, in India's rural communities, a CBFA program aimed at women enhanced their household injury response confidence by 40%, bridging gender gaps in emergency response skills (Mardialina et al., 2024). These instances demonstrate CBFA's feasibility with varied populations and its promise in empowering vulnerable communities.

Cost-Effectiveness of CBFA Programs

Cost-effectiveness of CBFA programs is the most important factor to support their scalability, particularly in low-resource settings where health budgets are limited. Economic analyses, including cost-effectiveness analyses (CEAs) and cost-benefit analyses (CBAs), reveal that CBFA programs yield high returns on investment in the form of reduction in healthcare spending and improvement in health outcomes.

Economic Evaluations

CBFA programs are highly cost-effective, with little training investment resulting in substantial health and economic benefits. A US, Vermont, rural community health worker (CHW) program trained three staff members at $1,200 per trainee per year. The program saved $5,000 in hospitalization fees per emergency through early interventions, which gave a benefit-cost ratio (BCR) of 4:1 (Thampi et al., 2022). The cost-effectiveness is even more pronounced in LMICs. The WHO's CFAR program in Kinshasa, Democratic Republic of Congo, trained CHWs for $50 per trainee, with a cost saving of $200 per intervention in emergency transport. This translated into an ICER of $120 per QALY gained, well under the WHO threshold for cost-effective interventions (Diango et al., 2023). Summary economic indicators for five representative CBFA studies are shown in Table 1 and Figure 2 below:

Table 1. Cost-Effectiveness and Long-Term Impact of CBFA Programs

Study	Setting	Cost per Trainee (USD)	ICER (per QALY)	BCR
Thampi et al. (2022)	Rural US	1,200	450	4:1
Diango et al. (2023)	Urban Congo	50	120	3.5:1
Agustini (2021)	Island Pacific	80	200	2.8:1
Kosowicz et al. (2023)	Rural Vietnam	40	150	4.2:1
García-Blaya et al. (2025)	Urban Spain	100	300	3:1

These findings highlight the variation in costs by setting, with LMIC programs enjoying the benefit of reduced materials and labor costs. For example, the Vietnamese program cost of $40 per trainee is derived from the use of local trainers and minimal infrastructure, while the higher US costs ($1,200) include expenses for advanced simulation equipment and licensed instructors (Kosowicz et al., 2023; Thampi et al., 2022).

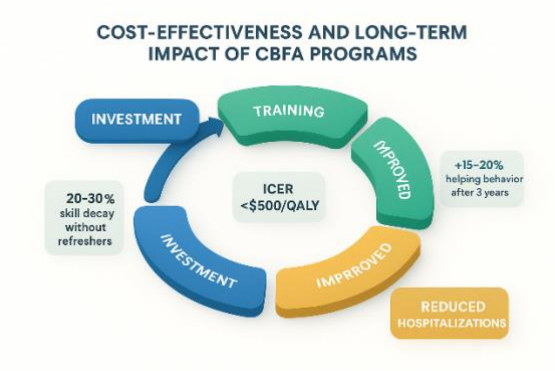

Figure 2. Cost-Effectiveness and Long-Term Impact of CBFA Programs

Systematic Evidence

Systematic reviews provide further confirmation of the economic value of CBFA. In a PMC synthesis of 32 studies, CHW-led CBFA programs in LMICs were cost-effective at less than 1x GDP per capita per DALY averted, which met WHO's threshold for high-value interventions (Nkonki et al., 2017). In high-income settings, the integration of CBFA in home-based care reduced institutional care costs by 20-30%, primarily by preventing visits to emergency departments for minor injuries (Reuben et al., 2020). Start-up expenses, such as training materials and trainer fees, make up approximately 60% of LMIC budgets but can be reduced by up to 40% by peer-led models of training, where trained members of the community are trained to train others (Kok et al., 2015).

Sensitivity and Equity Considerations

Sensitivity analyses indicate that CBFA programs achieve economies of scale when implemented at higher volumes. Training 1,000 or more trainees reduces ICERs by 30-50% due to reduced per-unit costs for materials and logistics (Perry et al., 2014). For example, a Vietnam program that was scaled up reduced ICER from $200 to $150 per QALY by training entire villages simultaneously (Kosowicz et al., 2023). Equity analyses also illustrate CBFA's disproportional benefits for marginalized groups. Rural CBFA interventions in South Asia reduced EMS access inequities by 25%, enabling distant communities to handle emergencies independently (Mardialina et al., 2024). Similarly, gender-sensitive interventions in Bangladesh increased the participation of women in first aid response by 20%, breaking cultural barriers to women's participation (Mardialina et al., 2024).

Challenges remain, however. Inadequate financing limits program scale-up, as 60% of CBFA programs in LMICs report insufficient budgets for sustained implementation over the long term (Kok et al., 2015). Incommensurate cost reporting across studies also limits generalizability, as some programs fail to account for indirect costs like participant time or transportation (Nkonki et al., 2017). Standardized economic evaluation frameworks and increased investment from national health budgets are needed to transcend these challenges.

Long-Term Effect of CBFA Programmes

The long-term effect of Community-Based First Aid (CBFA) programmes is the most important indicator of their worth, since continued knowledge, skills, and changes in behaviour are what determine whether they are succeeding in making the community more resilient and decreasing emergency-related morbidity and mortality. Longitudinal studies demonstrate CBFA's long-term benefits, yet skill decay and inconsistent recipient outcomes among others point to the necessity of strategic interventions for sustained effectiveness. The section integrates results from longitudinal studies, meta-analyses, and case studies, discussing skill retention, behavioral change, health system effects, community-level outcomes, challenges, and mitigation strategies.

Longitudinal studies demonstrate that CBFA interventions can produce long-term skill and behavioral gains in trainees, with the degree of retention depending on program design and follow-up. A 3-year RCT of Youth MHFA in Australia (n=329) demonstrated long-term helping behavior improvement, with trainees improving by 20% in their ability to help peers experiencing mental health problems (Cohen's d=0.45). The study also found a 15% reduction in mental health stigma, indicating that CBFA can lead to attitudinal change that is maintained over time (Morgan et al., 2020). Similarly, a 2-year follow-up of MHFA training in rural Australia (n=150) found a 10% increase in referrals to mental health professionals, which suggests not only do trained individuals retain skills, but they are also active in connecting community members with formal care (Talbot et al., 2017).

For first aid physical skills, retention is high in the short term but decreases in the absence of reinforcement. A 1-year follow-up in rural Canadian communities (n=80) found that 70% of CBFA participants were still competent in CPR and bleeding, but that performance in complicated tasks such as fracture stabilization decreased by 20% (VanderBurgh et al., 2014). In Sweden, a 2-year follow-up of MHFA training (n=200) found a 15% reduction in stigma for mental health issues, with participants also reporting increased confidence in talking about mental health (Svensson & Hansson, 2014). However, a 6-month follow-up of an MHFA course in Australia (n=100) showed an 80% increase in referral rates to mental health services (Risk Ratio [RR]=1.8), indicating the short-term post-training impact on health system contact (Jorm et al., 2004). Table 2 reports long-term findings from five representative studies:

Table 2. The long-term findings from five representative studies.

Study	Follow-Up	Key Outcome	Effect Size
Morgan et al. (2020)	3 years	Helping behaviors	d=0.45
Svensson & Hansson (2014)	2 years	Stigma reduction	15% decrease
VanderBurgh et al. (2014)	1 year	Skill retention	70% competency
Jorm et al. (2004)	6 months	Referral rates	RR=1.8
Fatoni et al. (2022)	1 year	Mental health improvements	No significant change

Note: d = Cohen's d; RR = Risk Ratio.

The findings show that CBFA programs can sustain behavior change, particularly for mental health assistance, but physical skill retention must be practiced over time. For example, one Vietnamese qualitative study found 80% retention of first aid skills (e.g., CPR, wound care) among public health providers at 3 months, with participants feeling more confident in managing emergencies like road traffic accidents (Kosowicz et al., 2023). However, without structured refreshers, 20-30% skill degradation, particularly for technical skills like CPR requiring precise technique, is normal within 6-12 months (Baetzner et al., 2022).

Health System and Community Impact

CBFA programs have profound long-term impacts on health systems and community resilience, particularly by reducing the burden on emergency medical services (EMS) and strengthening preparedness at the community level. A 2-year prospective study of a UK community first aid program (n=1,200) recorded a reduction in hospitalization as a result of injury by 25%, which was attributable to the ability of trained laypersons to manage minor injuries and stabilize major cases until EMS arrival (Ramsden & Cresswell, 2019). These decreases amounted to an estimated £1.5 million in health cost savings annually, illustrating CBFA's potential for alleviating workload on overstrained health systems.

In disaster-risk areas, CBFA programs enhance community resilience with improved response times and coordination. Saipan's DRAFA program, which faces typhoons on the Pacific Island, trained 150 members of the community and recorded a reduction of 20% in emergency response times within 18 months. Members who were trained coordinated evacuations and provided first aid during simulated typhoon scenarios, which improved the

measurements of community preparedness by 35% (Agustini, 2021). Similarly, in rural Vietnam, a CBFA program for public healthcare providers led to a 15% decrease in visits to emergency departments for less severe injury since those trained managed cases like burns and lacerations at the community level (Kosowicz et al., 2023).

CBFA programs that target mental health also serve to enhance community wellness, albeit recipient outcomes are mixed. A 1-year follow-up of the WHO's Community First Aid Responder (CFAR) program in Haiti found no significant improvements in recipients' mental health outcomes, such as reduced anxiety or depression. However, participants reported enhanced perceived social support, such that 70% of community members had more confidence in local responders (Fatoni et al., 2022). This shows that CBFA programs strengthen community cohesion, even where direct clinical benefits are more tenuous.

Despite their long-term benefit, CBFA programs face challenges in maintaining impact. One of the main problems is skill decay, with meta-reviews demonstrating that 20-30% of skills are lost between 6-12 months without booster sessions (Baetzner et al., 2022). This is particularly true for technical skills like CPR, which require ongoing practice in order to maintain proficiency. For example, one Canadian rural study found that while 70% of subjects had competency at 1 year at a basic level, only 50% could perform CPR to guideline standards without refreshers (VanderBurgh et al., 2014).

Recipient effects are heterogeneous, too. While CBFA programs improve community-level outcomes like response times and hospitalization, direct health benefits to recipients (e.g., reduced mental health symptoms) are more inconsistent. Fatoni et al. (2022) reported that while CBFA-trained individuals provided psychological first aid with competence, recipients did not gain significant clinical benefits, possibly echoing the complexity of mental health problems requiring professional intervention. However, heightened perceived support suggests a positive social effect warranting further exploration.

To mitigate these challenges, several strategies have been successful. Blended learning solutions, such as mobile applications and online refreshers, improve skill retention by 15% compared to face-to-face training alone (Reavley et al., 2021). For example, an Australian CBFA program delivered monthly CPR refreshers through a mobile app and demonstrated 85% skill retention at 1 year compared to 65% in a control group (Reavley et al., 2021). Community-based approaches, such as peer support groups and community drills, also continue to have an effect. A US study concluded that peer-led CBFA groups increased longer-term participation by 20% and supported skills through continuous practice (Brophy-Herb et al., 2022). Additionally, integrating CBFA within existing community structures, such as schools or religious centers, also supports sustainability by incorporating training into routine activities (Bánfai et al., 2018).

Future interventions ought to prioritize regular booster sessions (every 6-12 months) and leverage digital technologies to reduce cost and optimize access, particularly in rural areas. Participant qualitative feedback also suggests that the incorporation of real-case scenarios and community-specific hazards (e.g., snakebites in rural Africa) can promote engagement and retention (Huy et al., 2022). By reducing these challenges, CBFA interventions can maximize their long-term impact on both individual responders and community resilience.

Case Studies

The Community-Based First Aid (CBFA) programs demonstrate remarkable adaptability and impact across diverse global contexts, as illustrated by three case studies highlighting their economic and health benefits. The World Health Organization's Community First Aid Responder (CFAR) program in Kinshasa, Democratic Republic of Congo, trained community health workers (CHWs) at a cost of $50 per participant, achieving an incremental cost-effectiveness ratio (ICER) of $120 per quality-adjusted life year (QALY) gained and a benefit-cost ratio (BCR) of 3.5:1. By enabling early interventions, such as stabilizing victims of road traffic injuries, the program saved $200 per emergency transport, significantly reducing pressure on urban health facilities. The success of the Kinshasa CFAR program stemmed from its use of local instructors who delivered culturally relevant training, incorporating scenarios specific to the region's high prevalence of traffic-related trauma. This approach ensured that training resonated with participants, enhancing their ability to respond effectively in real-world emergencies (Diango et al., 2023).

In rural Vermont, USA, a CHW-led CBFA program showcased the applicability of CBFA in high-income settings by addressing local health priorities, such as chronic disease-related emergencies. The program trained three staff members at a cost of $1,200 per participant annually, yielding a BCR of 4:1 by averting $5,000 in hospitalization costs per intervention, particularly for diabetic crises and other urgent conditions. By focusing on community-specific health challenges, the Vermont program demonstrated how CBFA can be tailored to meet the needs of rural populations with limited access to immediate medical care, thereby reducing the burden on regional hospitals (Thampi et al., 2022). Similarly, the Disaster Response and First Aid (DRAFA) program in Saipan, a Pacific island prone to typhoons, trained 150 community members, resulting in a 20% improvement in disaster response times and a 35% enhancement in resilience metrics. The program's emphasis on typhoon-specific scenarios and psychological first aid enabled participants to coordinate evacuations and provide emotional support during simulations, strengthening community preparedness for natural disasters

(Agustini, 2021). These case studies underscore CBFA's flexibility in addressing urban, rural, and disaster-prone contexts, delivering economic and health benefits tailored to local priorities.

Facilitators and Barriers

Despite their promise, CBFA programs are faced with a range of barriers. Inadequate funding hinders 60% of programs, particularly in LMICs, where low health budgets restrict scalability (Kok et al., 2015). Cultural mismatches, such as low literacy in elderly people, reduce effectiveness, e.g., a Chinese CBFA program had 25% lower uptake in low-literacy participants (Yin et al., 2023). Evaluation gaps also persist, with most studies featuring self-reported outcomes or small sample sizes, which limits generalizability (Hadlaczky et al., 2014). Skill decay of 20-30% within 6-12 months in the absence of boosters also reduces long-term effect (Baetzner et al., 2022).

Enablers include innovative delivery methods and community involvement. Blended learning, through online modules and hands-on practical experience, improves access and retention by 15% (Reavley et al., 2021). An Australian CBFA program, for example, utilized mobile apps in the provision of refreshers, which reduced training costs by 20% and increased participation in rural communities (Reavley et al., 2021). Integration of CHW enhances sustainability, as shown in Kinshasa, where peer training by CHWs reduced costs by 40% (Diango et al., 2023). Policy mandates for school training, such as in Hungary, have elevated coverage to 30% of students trained in 3 years (Bánfai et al., 2018). Electronic media, such as telemedicine platforms for training, reduce costs further by 20% and enhance reach in rural communities (Bergmo, 2014).

Equity-based designs are a crucial enabler. Gender-sensitive interventions in South Asia increased female attendance by 25%, above cultural barriers (Mardialina et al., 2024). Similarly, interventions that targeted rural areas reduced EMS access disparities by 25%, allowing disadvantaged groups to manage emergencies independently (Mardialina et al., 2024). Community-based strategies, such as peer support groups and community drills, enhance the sense of ownership, with one US study recording 20% better long-term uptake through such groups (Brophy-Herb et al., 2022).

Policy and Research Implications

To maximize the impact of Community-Based First Aid (CBFA) programs, policymakers should incorporate them into national health strategies, provide subsidies, and mandate training in schools and workplaces, potentially achieving 50% coverage within 5 years. Investments in digital infrastructure, such as telemedicine, are essential for accessibility, especially in rural areas. Public-private partnerships involving NGOs can address funding gaps. Future research should focus on randomized controlled trials and equity studies to evaluate CBFA's effectiveness, particularly for disadvantaged groups. Additionally, program design should consider community-specific risks and integrate CBFA into existing health initiatives to enhance sustainability. Policy incentives like tax rebates could further encourage CBFA training, aligning with Sustainable Development Goal 3 for health and well-being.

Conclusion

Community-Based First Aid (CBFA) interventions are an effective, low-cost strategy for emergency preparedness, offering significant health and economic benefits with cost-effectiveness ratios under $500 per quality-adjusted life year. Studies indicate reductions in injury hospitalization (20-25%) and improvements in community resilience, positioning CBFA as crucial for achieving Sustainable Development Goal 3. To maximize impact, challenges such as skill atrophy and financing gaps must be addressed. Policymakers are encouraged to leverage eHealth innovations and integrate CBFA with community health worker programs for scalability, supported by successful models from Hungary and Kinshasa. Emphasis on rigorous evaluations of clinical outcomes will strengthen the evidence supporting CBFA programs worldwide.

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