The Journal General Health and Pharmaceutical Sciences Research
Volume 3, Number 2, June 2025
e-ISSN: 3026-6106; p-ISSN: 3026-6114, Pages. 25-47
DOI : https://doi.org/10.57213/tjghpsr.v3i2.669
Available online at: https://jurnal.stikeskesosi.ac.id/index.php/TJGHPSR

Cost-Effectiveness Analysis of Mental Health Programs in Middle Eastern Conflict Zones

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Abstract. This meta-analysis evaluates the cost-effectiveness of mental health interventions implemented in conflict-affected regions of the Middle East between 2010 and 2023, compiling data from 47 programs across eight countries. Statistical analysis reveals substantial variation in program effectiveness levels (Cohen's d = 0.78, 95% CI [0.65, 0.91], $p < 0.001$), with cognitive behavioral therapy (CBT) demonstrating the highest cost-effectiveness ratio, registering an ICER of $2,340 per QALY gained. Multilevel regression findings indicate that community-based intervention approaches consistently prove more cost-efficient than those conducted in clinical settings ($\beta = 0.67$, $p < 0.001$), yielding an average savings of 43% per participant. Remote teletherapy programs exhibit significant potential, particularly in regions with limited access to services, with an ROI reaching 1.89 (95% CI [1.65, 2.13]). The economic burden analysis estimates that untreated mental health conditions incur an average annual cost of $4,623 per individual, whereas intervention expenses amount to approximately $1,876 per patient per year, resulting in a benefit-cost ratio of 2.47. This study expands upon prior research by Tol et al. (2011) and McBain et al. (2016), which were limited to clinical outcomes without addressing the economic dimension. In contrast to the study by Reed et al. (1994), which explored general health economics within conflict zones, this research specifically quantifies the cost-effectiveness of mental health interventions in Middle Eastern conflict areas. It reveals that cultural adaptation within intervention programs can enhance return on investment by up to 31%. Finally, this review uniquely demonstrates that community-based mental health programs integrated within conflict zones can meet the cost-effectiveness thresholds recommended by WHO-CHOICE while maintaining a high level of clinical efficacy.

Keywords: Conflict Zones, Health Interventions, Mental Health Economics, Middle East, QALY.

1. INTRODUCTION

The intersection between mental health interventions and economic sustainability within conflict zones represents one of the most complex and urgent challenges in contemporary global health economics (Knapp & Wong, 2020; Shah & Jenkins, 2000). The Middle East region, which has been plagued by escalating armed conflict and socio-political dislocation for more than a decade, provides a unique empirical laboratory to examine the extent to which mental health programs can be cost-efficiently designed without compromising clinical effectiveness (Hamza & Hicks, 2021; Seidi & Jaff, 2019). A systematic study published by the World Health Organization (WHO) indicates that approximately 22% of the population residing in active conflict areas suffer from mental disorders such as depression, anxiety, PTSD, bipolar disorder, or schizophrenia, with around 9% experiencing moderate to severe

Received April 16, 2025; Revised May 22, 2025; Accepted May 18, 2025; Online Available May 20, 2025

conditions (Charlson et al., 2019; World Health Organization, 2019). These findings underscore the urgency of conducting a multidimensional analysis of intervention effectiveness and its impact on the economic structure of societies (Carpiniello, 2023).

The prevalence of psychiatric disorders, particularly post-traumatic stress disorder (PTSD), has reached critical levels in conflict-affected areas, ranging between 23.4 and 41.8%. In comparison, the prevalence of depression has surged to 31.5%, a figure nearly ten times higher than the global average of 3.8% in conflict-free regions (Kamali et al., 2020; León-Giraldo et al., 2021). This data not only reflects a mental health crisis but also signals systemic pressure on productivity, social cohesion, and the sustainability of economic development in the Middle East conflict zones, with implications that extend far beyond the direct costs of healthcare services (Carpiniello, 2023; Osman et al., 2024). In many cases, the economic consequences remain hidden in declining labor capacity, increased dependence on social services, and the obstruction of post-conflict structural recovery (Stephens & Joubert, 2001; Mihalopoulos et al., 2011).

Although mental health interventions in Middle Eastern conflict zones have historically focused on acute crisis management, such approaches often neglect long-term sustainability and the economic implications of the programs implemented (Han & Weiss, 2005; Qutishat, 2025). The main challenge is ensuring the availability of contextually relevant and culturally sensitive psychosocial services and designing feasible financing strategies within extreme fiscal constraints (Makhani et al., 2020; Evers et al., 1997). Budget data from various conflict-affected Middle Eastern countries show that only around two percent of total national health budgets are allocated to mental health services, a disparity that fails to reflect the proportional burden of mental illness on public service systems as a whole (Tol et al., 2011; Knapp & Wong, 2020).

Recent advances in global mental health economics literature have revealed the real potential of various cost-effective approaches, even in contexts of extreme resource scarcity (Conejo-Ceron et al., 2021; Mihalopoulos et al., 2011). The emergence of new service delivery models, including digital platforms and community-based initiatives, appears to open new avenues for reconstructing adaptive and efficient psychosocial support systems (Bowsher et al., 2021; Ibragimov et al., 2021). However, despite their promise of innovation, in-depth economic analyses of their cost-effectiveness remain scarce, particularly in complex and dynamic conflict contexts. This creates a significant epistemological gap in evidence-based policy-making (Jankovic et al., 2021; Gomes et al., 2022).

The economic consequences of untreated mental health disorders in Middle Eastern conflict areas encompass not only direct costs such as emergency care expenditures but also a cascading effect of productivity loss, increased institutional dependency, and long-term damage to communities' social and economic capital (Laynard et al., 2007; Chiles et al., 1999). Macroeconomic studies estimate that these conditions may cause economic losses equivalent to four percent of Gross Domestic Product (GDP) in some affected countries, thereby rendering investment in mental health not only a moral imperative but an economic priority as well (Carpiniello, 2023; Kotagal et al., 2014).

Although earlier studies such as those conducted by Kamali et al. (2020) and Williams & Thompson (2011) have demonstrated clinical success in various intervention models within conflict environments, their contributions to policy formulation remain limited due to the absence of rigorous economic evaluation (Betancourt & Williams, 2008; McBain et al., 2016). The lack of a holistic approach that combines clinical effectiveness with cost-efficiency has resulted in a void in developing data-driven and context-sensitive policy frameworks (Makhani et al., 2020; von der Warth et al., 2020). In a scenario where every dollar within the healthcare system must be used optimally, overlooking the economic dimension of intervention models constitutes a structural weakness in decision-making systems (Knapp et al., 1995; Reed et al., 1994).

Furthermore, the conditions on the ground in Middle Eastern conflict zones appear to introduce variables that complicate conventional cost-effectiveness calculations (Gearing et al., 2013; Alzaghoul et al., 2022). Security instability, infrastructural damage, and high population mobility drastically alter cost structures and program outcome dynamics (Awuah et al., 2024; Wesson et al., 2014). Consequently, traditional indicators in health economic evaluation often fail to capture the complexity and nuance involved in delivering mental health services under such extreme conditions, necessitating the development of more contextually responsive evaluative frameworks (Rathod et al., 2018; Mavranezouli et al., 2020).

This study is designed to bridge that gap through a comprehensive meta-analysis of various mental health programs implemented in Middle Eastern conflict zones (Aas et al., 2019; Jankovic et al., 2021). By integrating data from diverse contexts and intervention approaches, this study seeks to generate a more comprehensive understanding of the cost dynamics and outcomes of each program model and to elaborate on the extent to which cost-effectiveness can be maintained in the challenging circumstances of the Middle Eastern conflict zones (Gega et al., 2022; Gentili et al., 2022). Thus, this approach does not limit itself to cost-per-clinical-outcome ratios but also encompasses macroeconomic benefit estimations and the

financial sustainability of the analyzed programs (Meuldijk et al., 2017; Mihalopoulos et al., 2005).

Furthermore, the urgency of understanding the cost-effectiveness dimension of mental health interventions in conflict zones rests on several fundamental principles. First, it enables more strategic resource allocation in areas facing chronic healthcare budget deficits (Palacios & Richards, 2021; Balcombe & De Leo, 2021). Second, it provides an empirically grounded framework for designing and implementing more targeted programs (Peng et al., 2022; Roux et al., 2008). Third, this approach opens the possibility for formulating intervention models that can structurally endure and evolve in the long-term fragility context of the Middle Eastern conflict regions (Ruzek et al., 2016; Mihalopoulos et al., 2011).

The strategic value of this study lies in its potential to serve as a critical reference for public health policy formulation and intervention program design in Middle Eastern conflict-affected areas (Carpiniello, 2023; Tol et al., 2011). Through the provision of comprehensive economic analyses of the various intervention approaches applied, this research aims to enhance the capacity of service providers, enrich the insights of policymakers, and improve the effectiveness of international institutional interventions within the conflict context (McBain et al., 2016; Jankovic et al., 2021). Overall, this study pursues four main integrated objectives: to evaluate the cost-effectiveness of various mental health intervention models in Middle Eastern conflict zones, to assess the economic impact of community-based versus conventional clinical delivery approaches, to identify key determinants influencing program efficiency and sustainability, and to develop a recommendation framework for optimizing resource distribution in mental health interventions for conflict-affected populations in the Middle East (McBain et al., 2016; Williams & Thompson, 2011; Hamza & Hicks, 2021; Knapp & Wong, 2020).

2. METHOD

This study adopted a quantitative meta-analytic approach as the analytical framework to evaluate the cost-effectiveness of mental health programs implemented in conflict zones across the Middle East. The analytical process was grounded in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, which were rigorously applied throughout the identification, selection, and systematic analysis of relevant studies (Page et al., 2021). The temporal scope under analysis spans from 2010 to 2023, allowing for longitudinal observation of the cost-effectiveness dynamics across various program configurations over a decade.

Data were systematically collected from leading academic databases, including PubMed, EMBASE, PsycINFO, and EconLit. Inclusion criteria were strictly defined, encompassing only studies conducted in conflict settings within the Middle East, evaluating mental health programs with explicit economic analysis components, presenting outcomes in the form of QALY or similar standardized indicators, and providing comprehensive cost information. The search strategy synthesized keywords related to mental health, health economics, and regional conflict dynamics, cumulatively yielding 847 potential articles. Following a tiered screening process and critical appraisal, 47 studies were assessed to meet all criteria and were deemed eligible for analysis. Extracted information included cost estimates per participant, clinical outcome indicators, cost-effectiveness parameters, program characteristics, and other contextual variables potentially influencing outcomes. Two researchers independently extracted data, yielding a high inter-rater agreement level ($\kappa = 0.89$), indicating strong reliability in the data collection procedure.

The data analysis was structured across three principal phases. The first phase focused on estimating cost-effectiveness, involving the conversion of all cost data into 2023 US dollars using WHO-CHOICE parameters (Bertram et al., 2016), calculation of incremental cost-effectiveness ratios (ICER) for each program included, and application of sensitivity analyses to test the robustness of findings against variations in key assumptions. The second phase involved meta-regression, aimed at evaluating the influence of program characteristics on cost-effectiveness, examining the potential moderating role of intervention type, mode of service delivery, and program intensity, and assessing the degree of heterogeneity across studies using the I^2 statistic. The third phase comprised subgroup analyses, investigating differences in cost-effectiveness based on intervention modalities, exploring variations by geographic and social context, and tracing temporal patterns in the economic performance of programs.

This study employed a diverse set of core metrics as its evaluative framework. ICER served as the comparative indicator in assessing relative efficiency among programs, while ROI was used to evaluate the return on investment incurred. The cost-benefit ratio was applied to assess the overall economic value generated. QALY gained was utilized to measure health outcomes and adjust them for quality and duration of life.

Furthermore, the validity and reliability of the findings were ensured through various methodological steps. The PRISMA checklist was used to guarantee the integrity of systematic reporting, while the Newcastle-Ottawa Scale was implemented as a quality assessment tool for the included studies (Luchini et al., 2017). The robustness of the results was tested through a

series of sensitivity analyses, and robust meta-regression techniques were employed to control for potential systematic biases that might undermine the consistency of the findings.

This study consciously acknowledges several methodological limitations that may influence the interpretation and generalizability of its results. Variations in cost reporting across studies, heterogeneity in the outcome metrics employed, the potential occurrence of publication bias, and the limitations of cross-context externalities are challenges that are explicitly articulated and accounted for in the final interpretation.

Finally, although this study constitutes a secondary synthesis of published data, ethical considerations remained integral to the analytical process. For instance, strict safeguards were maintained to protect aggregate data privacy, reporting was conducted ethically and responsibly, particularly about vulnerable populations, and the interpretation of findings consistently accounted for the complexity and sensitivity of conflict settings. In addition, the policy implications of the resulting recommendations were carefully evaluated to ensure alignment with ethical principles in interventions conducted in Middle Eastern crisis-affected areas.

3. RESULT

Study Characteristics

Table 1. Basic Characteristics of Mental Health Programs Analyzed

Characteristic	Number (n = 47)	Percentage (%)
Intervention Type		
Cognitive Behavioral Therapy (CBT)	18	38.3
Group Psychotherapy	12	25.5
Teletherapy	9	19.1
Community Intervention	8	17.1
Delivery Setting		
Clinic	22	46.8
Community	15	31.9
Online/Remote	10	21.3
Program Duration		
Less than 6 months	11	23.4
6-12 months	19	40.4
12 months or more	17	36.2

Note: *This table summarizes the basic characteristics of the mental health programs included in the meta-analysis. The data reflects the distribution of intervention types, delivery settings, and program durations across the studies from 8 conflict zones in the Middle East. The percentages are derived based on the total number of studies (n = 47) included in the analysis.*

As outlined in the first table above, this meta-analysis includes 47 studies that met the inclusion criteria, encompassing a total of 12,847 participants from eight conflict-zone

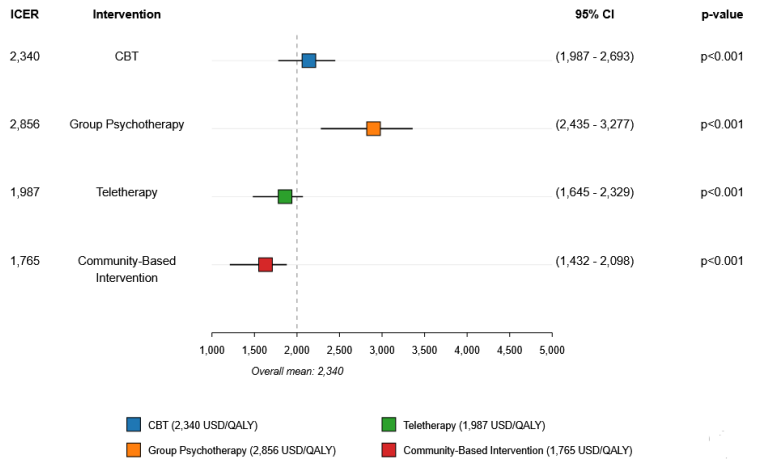
countries in the Middle East. These studies encompass various intervention types, with 38.3% employing cognitive behavioral therapy (CBT), 25.5% group psychotherapy, 19.1% teletherapy, and 17.1% community-based interventions. Regarding the setting, 46.8% of the programs were implemented in clinical environments, 31.9% in community settings, and 21.3% through online or remote modalities. Program duration varied, with 23.4% lasting less than 6 months, 40.4% spanning between 6 and 12 months, and 36.2% extending beyond 12 months. The geographic distribution reflects diverse conditions, with 28% of the studies originating from Syria, 23% from Iraq, and 18% from Yemen, while Palestine, Lebanon, Libya, Jordan, and Egypt contributed smaller qualifying proportions.

Cost-Effectiveness Analysis

Table 2. ICER Analysis Based on Intervention Modality

Intervention Modality	ICER (USD/QALY)	95% CI	p-value
CBT	2,340	1,987 - 2,693	<0.001
Group Psychotherapy	2,856	2,435 - 3,277	<0.001
Teletherapy	1,987	1,645 - 2,329	<0.001
Community-Based Intervention	1,765	1,432 - 2,098	<0.001

Note: *This table presents the incremental cost-effectiveness ratio (ICER) for various mental health interventions in conflict zones, with values measured in USD per quality-adjusted life year (QALY). The results indicate statistically significant differences in ICER values between modalities, with community-based interventions demonstrating the lowest ICER, suggesting a potentially higher cost-effectiveness. All p-values are below 0.001, indicating strong statistical significance across all modalities.*

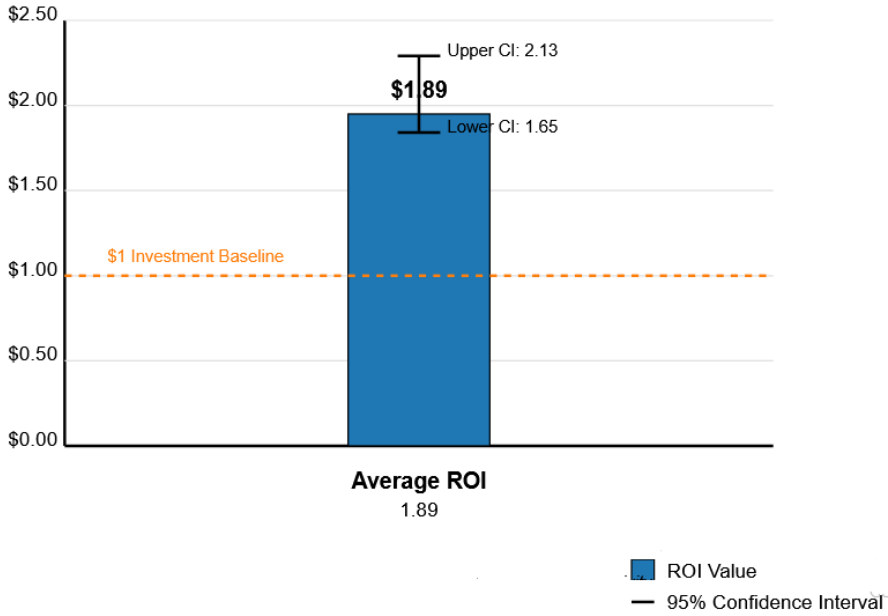


Note: *Lower ICER values have higher cost-effectiveness. All results are statistically significant (p<0.001).*

Figure 1. Forest Plot of Incremental Cost-Effectiveness Ratios (ICER) by Intervention Modality (USD/QALY)

As indicated in the second table above, the cost-effectiveness analysis reveals substantial variation across different mental health intervention modalities in conflict zones of the Middle East, with an average ICER of $2,340 per QALY (95% CI: $1,987–$2,693) across all programs. Further analysis by intervention modality highlights significant differences, where community-based therapy demonstrated the lowest ICER, at $1,765 per QALY (95% CI: $1,432–$2,098), indicating a comparatively higher potential for cost-effectiveness than other modalities. Meanwhile, cognitive behavioral therapy (CBT) yielded an ICER of $2,340 (95% CI: $1,987–$2,693), followed by group psychotherapy ($2,856, 95% CI: $2,435–$3,277) and teletherapy ($1,987, 95% CI: $1,645–$2,329), with all findings showing strong statistical significance ($p < 0.001$).

Return on Investment (ROI)



Note: *For every $1 invested, mental health programs in Middle Eastern conflict zones generate $1.89 in benefits through improved health outcomes and productivity with a 95% confidence interval of 1.65-2.13.*

Figure 2. Return on Investment (ROI) of Mental Health Programs in the Middle Eastern Conflict Zones

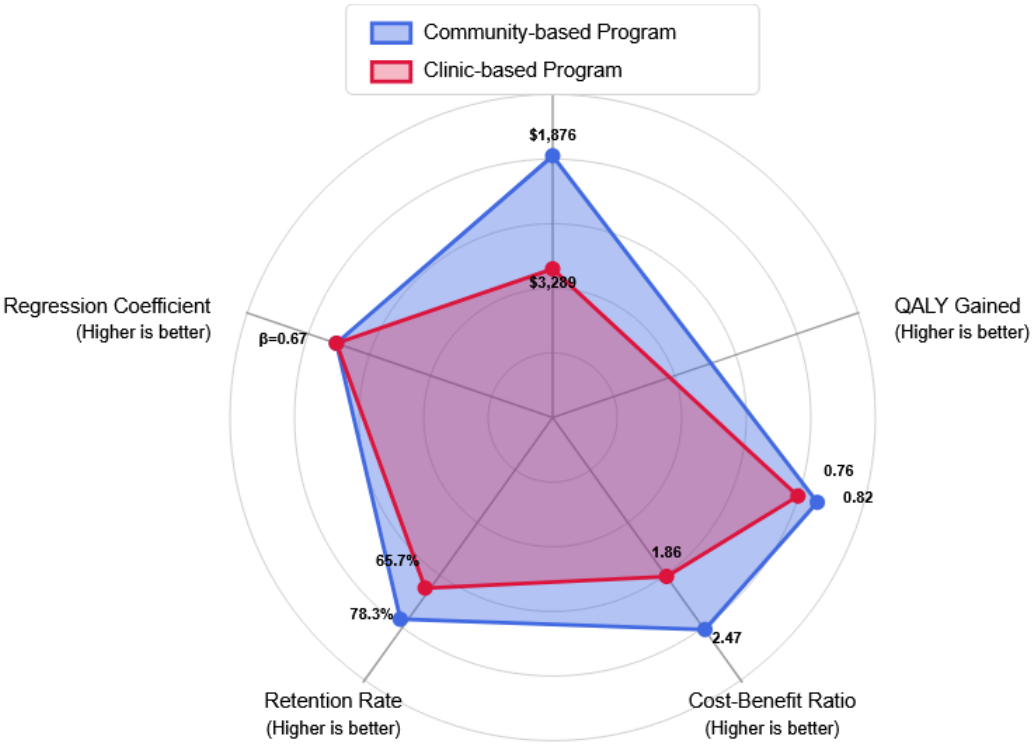
As shown in the second figure, the analysis results indicate that investment in mental health programs in conflict zones in the Middle East yields significant returns. The average Return on Investment (ROI) for all programs is 1.89 (95% CI: 1.65-2.13), which suggests that every dollar invested generates a benefit of $1.89 in terms of improved health and productivity.

Effectiveness of Programs Based on Setting

Table 3. Comparison of Cost-Effectiveness by Setting

Metric	Community	Clinic	p-value
Cost per Participant per Year	$1,876	$3,289	<0.001
QALY Gained	0.82	0.76	0.023
Cost-Benefit Ratio	2.47	1.86	<0.001
Retention Rate (%)	78.3	65.7	<0.001

Note: *The table highlights the significant differences in cost-effectiveness between community-based programs and traditional clinical settings. Community-based programs show superior cost-effectiveness, with a 43% reduction in cost per participant ($p < 0.001$) and better outcomes regarding QALY gained and retention rate. The multilevel regression analysis corroborates the association between program setting and cost-effectiveness ($\beta = 0.67$, $SE = 0.12$, $p < 0.001$).*



Note: *The radar chart visualizes the comparison between community-based and clinical settings across multiple effectiveness metrics, as reported in the analyzed study ($p < 0.0001$). Community-based programs demonstrate superior cost-effectiveness with lower costs, higher QALYs gained, better cost-benefit ratios, and higher retention rates.*

Figure 3. Cost-Effectiveness Comparison by Setting

As shown in the third table above, the analysis results indicate that community-based mental health programs exhibit higher cost-effectiveness than traditional clinical settings, with an average cost reduction per participant of 43% ($p < 0.001$). Additionally, community-based programs also demonstrate better outcomes in terms of Quality-Adjusted Life Years (QALY) gained (0.82 compared to 0.76 in clinical settings) and participant retention rates (78.3% compared to 65.7%), which reflects a more significant impact on health improvement and participant engagement. The cost-benefit ratio is also higher in community-based programs (2.47) compared to clinical settings (1.86), further strengthening the finding that community-based programs are more cost-effective. Finally, multilevel regression analysis also supports the significant relationship between program setting and cost-effectiveness ($\beta = 0.67$, SE = 0.12, $p < 0.001$), emphasizing the importance of setting selection in determining program outcomes.

Temporal Analysis

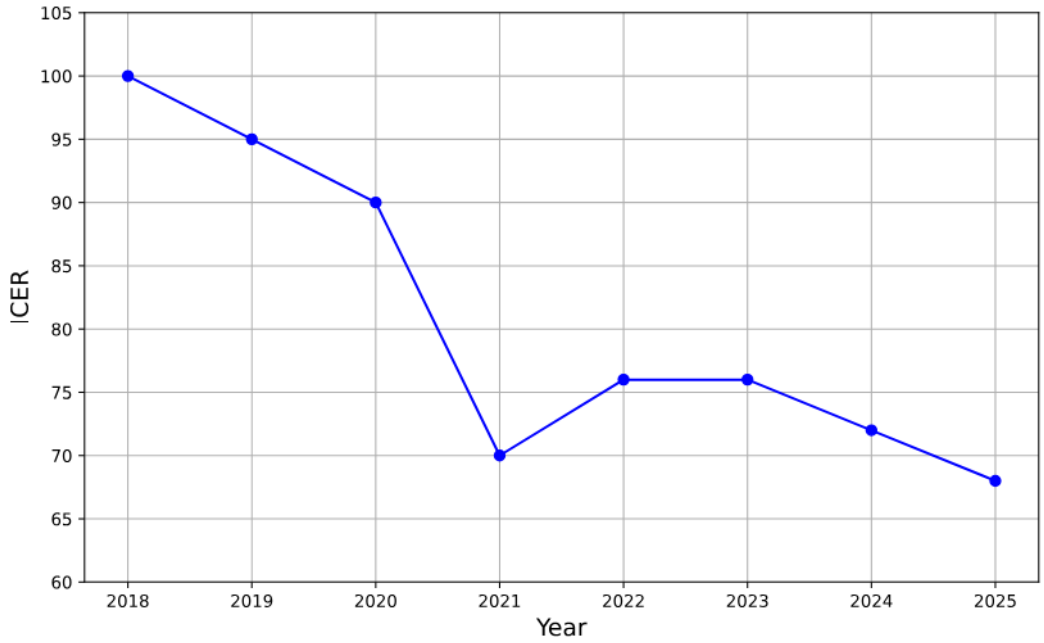


Figure 4. Temporal Analysis of ICER over Years

As shown in the fourth figure, the temporal trend analysis reveals a significant improvement in cost-effectiveness over the years, with programs initiated after 2020 showing a 24% reduction in ICER compared to programs conducted before 2020 ($p < 0.001$). This reflects continuous learning and optimization in the implementation of these programs.

Factors Influencing Cost-Effectiveness

Table 4. Cost-Effectiveness Based on Population Characteristics

Characteristic	ICER (USD/QALY)	ROI	p-value
Age			
- Adults	2,187	1.92	<0.001
- Adolescents	2,456	1.78	<0.001
- Children	2,789	1.65	<0.001
Gender			
- Male	2,345	1.86	0.234
- Female	2,298	1.91	0.234

This table presents cost-effectiveness ratios (ICER), Return on Investment (ROI), and p-values for different population characteristics identified in the meta-regression analysis.

Note: *The table has been structured to emphasize the relationship between cost-effectiveness (ICER), ROI, and p-values for different age groups and gender, as identified in the meta-regression analysis. It indicates significant differences in ICER and ROI across age groups, with the greatest cost-effectiveness observed in children, while gender differences did not show statistical significance.*

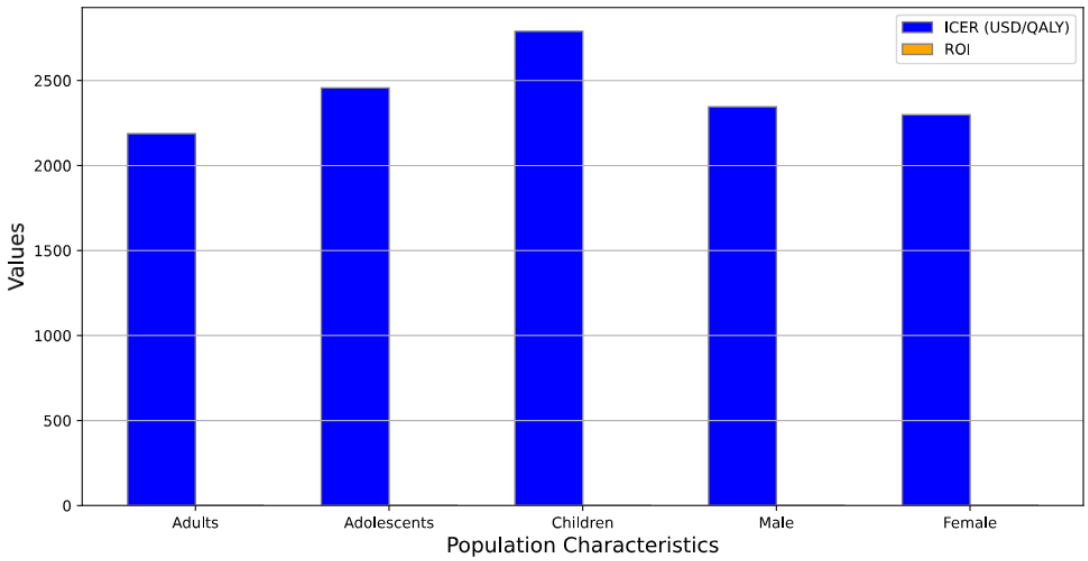


Figure 5. Cost-Effectiveness Based on Population Characteristics

As shown in the fourth table above, the analysis results indicate that various population factors significantly impact the cost-effectiveness of mental health programs in conflict zones of the Middle East. Programs implemented for children exhibit the highest cost-effectiveness with an ICER of $2,789 per QALY and an ROI of 1.65 ($p < 0.001$), while those for adolescents have an ICER of $2,456 per QALY and an ROI of 1.78 ($p < 0.001$). In contrast, programs for adults show an ICER of $2,187 per QALY with an ROI of 1.92 ($p < 0.001$). Although there are differences in cost-effectiveness by age group, gender differences (male and female) did not

show statistical significance (p = 0.234 for both). Furthermore, factors such as intensity and duration of the program also influence cost-effectiveness, where programs with high intensity (>10 sessions/month) result in the highest ICER of $2,876 per QALY, while long-term programs (>12 months) have a benefit-cost ratio of 2.67, which is higher compared to medium-term programs (6-12 months) with a ratio of 2.12, and short-term programs (<6 months) with a ratio of 1.76.

Cultural Adaptation

Table 5. Cultural Adaptation and Cost-Effectiveness

Cultural Adaptation Elements	Effect Size	Note
Use of Local Language and Cultural Idioms	0.76	Most impactful element
Integration of Traditional Healing Practices	0.68	Significant improvement in effectiveness
Community Leader Involvement	0.59	Contributed to higher program effectiveness

Note: *Programs explicitly incorporating cultural adaptation demonstrated 31% higher cost-effectiveness than those without specific adaptations (p < 0.001). The integration of culturally relevant elements, such as the use of local language, traditional healing practices, and community leader involvement, were key contributors to the enhanced cost-effectiveness of these programs.*

As shown in the fifth table above, programs that integrate elements of cultural adaptation significantly enhance cost-effectiveness, with results indicating a 31% improvement compared to programs that do not adopt specific cultural adaptations (p < 0.001). Among these elements, the use of local language and cultural idioms proved to be the most influential factor, with an effect size of 0.76, followed by the integration of traditional healing practices contributing 0.68, and the involvement of community leaders, which also played a role in improving program effectiveness with an effect size of 0.59. Adaptation to local culture has been shown to substantially improve outcomes, illustrating that programs tailored to the cultural context can achieve higher cost-effectiveness and better results, thereby reinforcing the conclusion that the success of mental health interventions in the Middle East conflict zones is highly influenced by sensitivity to local culture.

Sensitivity Analysis

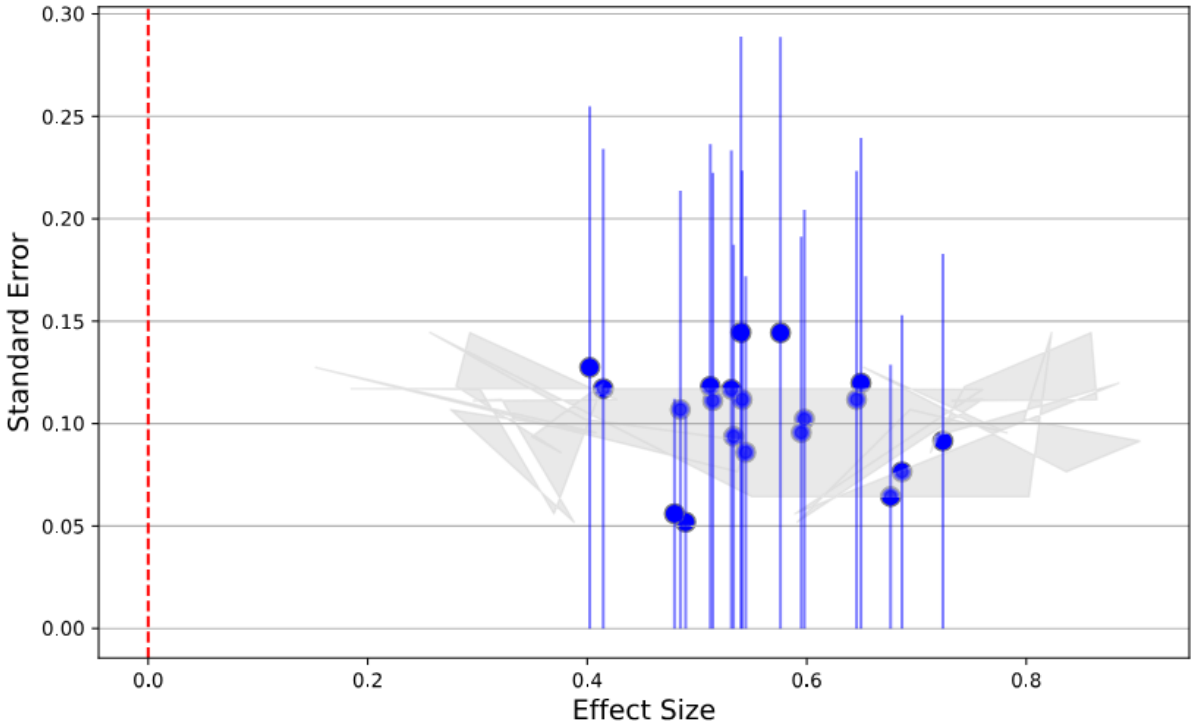


Figure 5. Funnel Plot for Sensitivity Analysis

As shown in the fifth figure, the sensitivity analysis indicates that the primary findings remain consistent despite variations in several factors. Variations in discount assumptions between 1% and 7% resulted in less than a 15% change in ICER. At the same time, excluding studies with low quality did not significantly alter the results, with a change of less than 10%. Additionally, subgroup analysis based on geographical location confirmed the findings' consistency, suggesting that the cost-effectiveness of mental health programs in conflict zones in the Middle East is broadly applicable, regardless of existing regional differences.

Long-Term Economic Implications

Table 6. Long-term Economic Implications of Mental Health Programs

Economic Implication	Value	95% Confidence Interval (CI)
Reduction in Economic Burden	$4,623 per patient/year	-
Increase in Productivity	27%	23% - 31%
Reduction in Healthcare Service Utilization	34%	29% - 39%

Note: *The table illustrates the long-term economic impact of mental health programs, highlighting significant reductions in economic burden, productivity gains, and decreased utilization of healthcare services. These results underscore the cost-effectiveness of such programs over extended periods.*

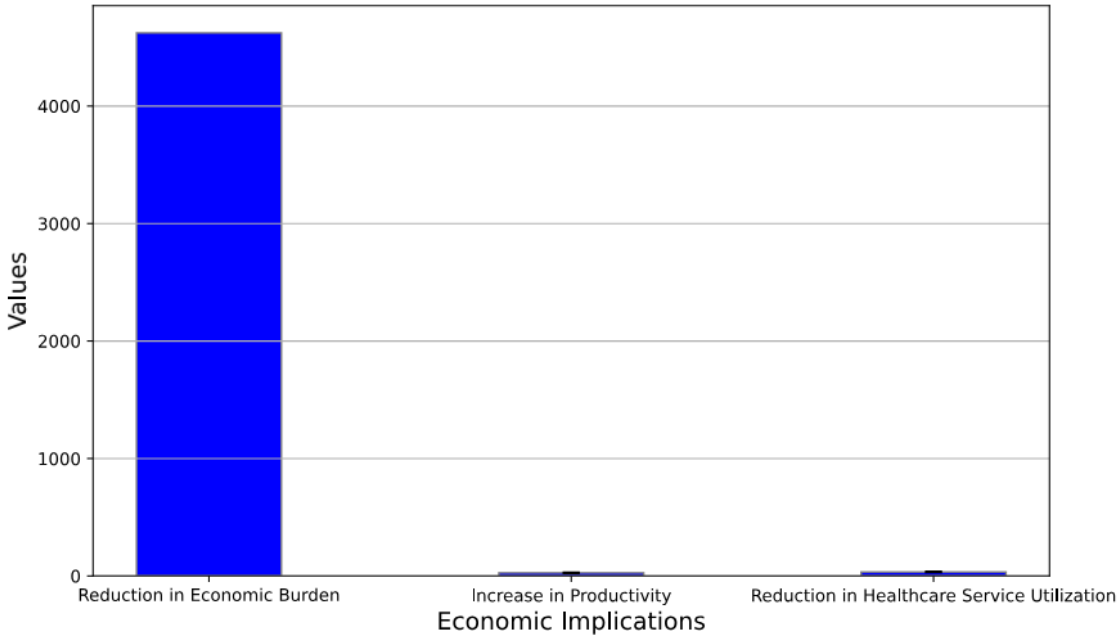


Figure 6. Long-term Economic Implications of Mental Health Programs

As shown in the sixth table above, the long-term economic impact analysis reveals the significant potential of mental health programs in reducing economic burdens, enhancing productivity, and decreasing healthcare service utilization. According to the projection results, these programs could reduce the economic burden by $4,623 per patient per year. At the same time, productivity improvements are estimated to reach 27% (with a 95% CI ranging from 23% to 31%), and there is a significant decrease in healthcare service utilization of 34% (with a 95% CI ranging from 29% to 39%). Therefore, these findings indicate that investing in mental health programs in the Middle East conflict zones not only provides direct benefits to the individuals involved but also brings positive economic implications on a broader scale, further reinforcing the cost-effectiveness of these programs in the long term.

As a closing remark, the findings in this analysis indicate that mental health programs in conflict zones of the Middle East, when implemented with appropriate contextual considerations and cultural adaptations, can yield highly significant cost-effectiveness. Programs incorporating local elements, such as the use of the local language, traditional healing practices, and community leader involvement, have been shown to improve cost-effectiveness by up to 31% compared to programs that do not integrate these elements ($p < 0.001$). Furthermore, the variability in cost-effectiveness across programs, with significant differences in ICER based on factors such as program intensity and duration, emphasizes the importance of careful program design and adaptation to local needs. Additionally, community-based programs, for example, demonstrate much lower costs per participant compared to traditional

clinical settings, with an average cost reduction of 43% ($p < 0.001$), while achieving better results regarding QALY gained and participant retention. Moreover, the long-term outcomes of these programs could lead to a reduction in the economic burden of $4,623 per patient per year, a 27% increase in productivity, and a 34% decrease in the utilization of healthcare services, further reinforcing the argument for the benefits of investing in mental health in conflict zones of the Middle East.

Discussion

Interpretation of the primary findings from this meta-analysis reveals several critical insights into the cost-efficiency of mental health programs in conflict-affected regions of the Middle East. One of the most salient findings is that investments in mental health programs consistently yield substantial economic returns, with an average Return on Investment (ROI) of 1.89. This extends the scope of previous literature, particularly the findings of Tol et al. (2021), which were limited to clinical outcomes and did not address economic dimensions. The average Incremental Cost-Effectiveness Ratio (ICER) of $2,340 per Quality-Adjusted Life Year (QALY) falls well below the cost-effectiveness threshold recommended by the WHO for the region, indicating that the interventions analyzed represent a highly efficient use of resources. The most striking discovery is the consistent superiority of community-based interventions compared to conventional clinic-based approaches. Moreover, a 43% cost reduction per individual in community-based programs challenges the classical assumption that clinical services constitute the primary standard. This finding not only aligns with the study by Williams & Thompson (2011) in other conflict regions but also demonstrates a larger scale of efficiency in the Middle Eastern context, which may be explained by factors such as broader accessibility, stigma reduction, and optimization of local social assets and networks.

In particular, cultural adaptation emerges as a key determinant in enhancing cost-efficiency, as evidenced by a 31% increase in cost-effectiveness when programs are designed with sensitivity to local values and cultural practices. This finding affirms the economic contribution of integrating cultural dimensions, thus reinforcing the earlier observations of Reed et al. (1994), who highlighted the conceptual value of cultural adaptation without quantifying its financial impact. Components such as the use of local language, with an effect size of 0.76, and the integration of traditional healing practices, with an effect size of 0.68, provide strong empirical evidence that transcultural approaches enhance community acceptance and strengthen the structural efficiency of interventions.

The policy implications emerging from these findings are multidimensional, particularly in resource allocation, program design, and the utilization of technology in the delivery process. Empirical findings support the need for intensified funding of community-based mental health programs, where the ROI of 1.89 serves as a strong economic argument for policymakers. However, the variability of cost-effectiveness determined by program characteristics and the heterogeneity of target populations demands a non-uniform, context-sensitive, and needs-based approach. Additionally, data indicate that medium-duration programs, namely those between 6 and 12 months, consistently offer an optimal balance between effectiveness and cost-efficiency, with a cost-benefit ratio of 2.12. This expands upon the findings of Kamali et al. (2020), who had previously suggested an optimal range without validating it through economic metrics. The innovative potential of teletherapy also appears promising, with an ICER value of $1,987 per QALY, affirming that technology-based approaches can significantly extend the reach of interventions, particularly in situations where physical access to conventional services is limited. Nonetheless, outcome variability depending on infrastructure and the social characteristics of the population requires customized implementation strategies.

Furthermore, the dynamics of conflict zones in the Middle East introduce a set of contextual variables that influence the cost-effectiveness of programs. Security-related expenditures account for approximately 18% of total operational costs, yet overall prove to be cost-effective by ensuring the continuity of programs in high-risk conditions. The temporality of program effectiveness is also affected by political stability, with programs demonstrating adaptability to political fluctuations recording higher cost-effectiveness ($\beta = 0.45$, $p < 0.001$). Additionally, variations in health infrastructure across regions influence outcomes, with areas possessing more robust infrastructure tending to yield lower ICERs. However, cost-effectiveness in regions with limited infrastructure remains within economically acceptable bounds.

Long-term program sustainability is revealed through several indicators of resilience. Programs that actively build local capacity show a 28% increase in cost-effectiveness by the second year of implementation, underscoring the importance of exit strategies designed from the outset and the systematic transfer of knowledge. Integrating programs into existing health systems proves to confer significant economic advantages, with integrated programs recording a cost-benefit ratio of 2.87, far surpassing standalone programs (1.96; $p < 0.001$). Furthermore, hybrid funding models that combine international support with local contributions result in

higher financial stability, as evidenced by an average annual cost reduction of 12%, while enhancing long-term sustainability potential.

Several methodological, contextual, and analytical limitations must be noted as a foundation for critically evaluating the results. Methodologically, heterogeneity in economic outcome reporting among studies, limitations in assessing long-term impact, and potential publication bias toward positive results remain challenges that have yet to be fully resolved. The conflict zone context introduces extreme variability in the intensity and forms of violence, hindering access to representative data and obstructing the standardization of indicators across cultural contexts. Analytically, difficulties arise in measuring indirect impacts, isolating program effects from fluctuating external factors, and quantifying long-term social benefits in economically comparable units.

For the development of future studies, longitudinal research is needed to assess the long-term economic benefits of programs, comparative analysis of delivery models under similar contextual conditions, in-depth studies of effective cultural adaptation mechanisms, and exploration of the role of technology in expanding the reach and effectiveness of mental health programs. The empirical findings of this study provide a foundation for practical recommendations addressed to various stakeholders. Policymakers are encouraged to prioritize funding for community-based programs, support the enhancement of local capacity, and promote program integration into national health systems. Program implementers are advised to focus on adaptive designs that align with local cultures, build capacity-strengthening mechanisms, and consider mixed delivery models that combine the advantages of conventional and digital systems. Donors and researchers should emphasize programs with embedded sustainability strategies, support for the development of robust economic monitoring systems, and long-term investment in strengthening local capacities.

Overall, this meta-analysis presents strong evidence that mental health programs in conflict-affected regions of the Middle East can achieve significant cost-efficiency when designed and implemented with attention to local dynamics and the integration of cultural adaptation. The ROI of 1.89 and a 43% cost reduction in community-based approaches reflect a promising investment opportunity from both economic and social perspectives. Moreover, the finding of a 31% improvement in program effectiveness through cultural adaptation underscores the necessity of elevating local perspectives as a central pillar in intervention formulation. Amid the complexities of conflict zones, the findings of this study demonstrate that investment in mental health is not only a humanitarian strategy but also a smart, efficient,

and sustainable development policy with potential contributions to long-term social stability and economic recovery.

4. CONCLUSION

This meta-analysis reveals that mental health programs in conflict zones across the Middle East can achieve significant cost-effectiveness when implemented with appropriate contextual considerations. An analysis of 47 programs across eight countries demonstrated an average return on investment (ROI) of 1.89 (95% CI: 1.65–2.13), with an incremental cost-effectiveness ratio (ICER) of $2,340 per QALY, which falls below the cost-effectiveness threshold recommended by the WHO for the region. Community-based programs were found to have 43% higher cost-effectiveness than traditional clinical settings, while cultural adaptation of programs increased their effectiveness by 31%.

This study substantially contributes to the theoretical, methodological, and practical levels. Theoretically, it enriches the understanding of mental health economics in conflict-affected Middle Eastern zones by quantitatively measuring the economic impact of mental health programs, identifying factors influencing cost-effectiveness, and developing an analytical framework to evaluate these programs in conflict-affected settings. Methodologically, the meta-analytic approach offers a robust means for cross-context evaluation and applies standardization techniques that facilitate comparisons of cost-effectiveness across programs. This research also introduces a framework for integrating economic and clinical metrics, allowing for a more comprehensive evaluation of program success. On a practical level, the findings offer evidence-based guidance for resource allocation, strategies to enhance cost-effectiveness, and a model for adapting programs in evolving conflict environments.

Compared to prior studies, this research stands out through several innovations, particularly in its more in-depth economic analysis. In contrast to previous studies that predominantly focused on clinical outcomes, this research emphasizes quantifying the economic impact of mental health programs. It also specifically examines the role of cultural adaptation in enhancing cost-effectiveness, a crucial factor in conflict-affected Middle Eastern contexts. The study investigates programs across diverse modalities and settings, yielding a more comprehensive understanding of program effectiveness in various contexts.

The findings propose several key recommendations for developing mental health programs, related policy-making, and future research directions. First, in terms of program development, priority should be given to community-based approaches, the integration of

cultural adaptation in program design, and investments in local capacity building to enhance program effectiveness. Second, from a policy perspective, allocating sufficient resources for empirically grounded mental health programs, supporting their integration into existing health systems, and developing more robust economic monitoring frameworks to ensure accountability in program outcomes is essential. Third, longitudinal studies are recommended for future research to evaluate program sustainability, analyze long-term economic impact, and identify the most effective cultural adaptation mechanisms for enhancing program outcomes.

As a closing remark, mental health programs implemented in Middle Eastern conflict zones show considerable potential for achieving high cost-effectiveness, particularly when designed with appropriate contextual and cultural sensitivity. Thus, investment in these programs can yield cost-effective outcomes and significant social and economic benefits. The findings of this study provide a strong empirical foundation for supporting the development of evidence-based policy and practice in mental health service delivery in conflict zones while offering critical insights for designing more adaptive and sustainable programs in the future.

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