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Strategies for improving Tuberculosis notification through incentives in primary care settings: Insights from a systematic review

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ABSTRACT

Background: Effective disease notification systems are crucial for managing public health issues, yet many countries face challenges related to under-reporting, particularly in the context of diseases such as tuberculosis. This systematic literature review aims to analyze incentive strategies designed to enhance health reporting in primary care settings. **Methods:** A comprehensive search of databases was conducted to identify studies published in the last five years that focused on incentive mechanisms in healthcare settings. The inclusion criteria comprised studies that assessed the impact of financial and non-financial incentives on health reporting and service performance. A total of 93 studies were included in the final analysis. **Results**: The findings indicate that both financial incentives, and non-financial incentives can significantly improve tuberculosis notification rates. Evidence suggests that well-structured incentive programs can lead to better engagement from healthcare providers, enhancing the accuracy and timeliness of disease reporting. Moreover, the effectiveness of these strategies are influenced by contextual factors, including local healthcare policies and provider awareness. **Conclusion:** This review underscores the importance of tailored incentive strategies in improving health reporting systems. Future research should focus on long-term outcomes and the integration of stakeholder perspectives to develop more effective and sustainable incentive frameworks.

Keywords: *Incentive strategies; Primary care; Systemic review; Tuberculosis; Tuberculosis notification*

INTRODUCTION

Effective tuberculosis notification is a critical component of primary healthcare systems, facilitating timely disease identification, management, and prevention. Nevertheless, significant challenges persist in ensuring that healthcare providers report health data accurately and promptly. In this context, financial incentives have emerged as a promising strategy to enhance tuberculosis notification practices among healthcare professionals. Numerous studies have evaluated the effectiveness of these incentives in altering healthcare behaviors and improving patient outcomes, yielding mixed results[1,2].

Recent systematic reviews indicate that financial incentives can significantly modify healthcare professional behaviors and positively impact patient outcomes[3,4]. Furthermore, innovative strategies such as reminder systems and administrative support have garnered positive feedback from healthcare providers, as they facilitate the delivery of preventive services[5,6].

Despite the potential advantages of financial incentives, their implementation is fraught with challenges. Methodological concerns regarding the rigor of studies examining these incentives have surfaced, revealing that many interventions suffer from limitations in completeness and generalizability[7]. Sustainability of improved practices following the withdrawal of financial incentives is questionable, raising concerns about its long-term effects on behavior change[8]. These challenges underscore the necessity for careful evaluations of incentive structures within primary care settings to ensure sustained improvements in tuberculosis notification practices.

The objective of this systematic review is to explore the impact of financial incentives on tuberculosis notification practices among healthcare providers in primary care settings. We seek to explore the types of financial incentives used, their effects on healthcare providers' behavior and patient outcomes, and the challenges of implementation, especially regarding sustainability and ethical concerns. We aim to identify best practices for designing and implementing effective financial incentive strategies to enhance tuberculosis notification and overall healthcare quality.

METHODS

Methodology

We performed a systematic review of literature on the

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effectiveness of incentive strategies in enhancing tuberculosis notification practices within primary healthcare settings. We used a comprehensive search strategy with strict inclusion and exclusion criteria to identify studies. Systematic data extraction and rigorous quality assessment of the selected studies were performed.

Search Strategy

We searched multiple electronic databases, including PubMed, Scopus and Web of Science, to identify relevant studies published in the last five years, by using a combination of keywords and phrases related to "financial incentives," "tuberculosis notification," "primary healthcare," and "preventive care." Boolean operators (AND, OR) were used to refine search results, ensuring that both broad and specific aspects of the topic are captured. The search was restricted to articles published in English to maintain linguistic consistency.

Study selection

Inclusion criteria:

- Randomized controlled trials and case reports focusing on the implementation of financial incentive strategies aimed at improving tuberculosis notification in primary healthcare settings.
- Peer-reviewed articles published within the last five years.
- Research reporting outcomes related to healthcare provider behavior, patient outcomes, or tuberculosis notification rates.

Exclusion criteria:

- Studies that do not provide original data, such as editorials, commentaries, and opinion pieces.
- Research conducted outside of primary care settings.

Data extraction

Data from the included studies was extracted using a standardized form designed to capture essential information including 1) author(s) and year of publication; 2) study design; 3) population characteristics, including sample size and demographic details; 4) types of financial incentives implemented (e.g., direct payments, performance bonuses); 5) outcomes measured, including changes in tuberculosis notification rates, healthcare provider behavior, and patient health outcomes; and 6) key findings and conclusions drawn from each study.

Quality assessment

The quality of the included studies was assessed using the Cochrane Risk of Bias Tool for randomized controlled trials (RCT) and the Newcastle-Ottawa Scale for observational studies.

Data synthesis

A narrative synthesis was used to summarize findings from the included studies, identifying key themes, patterns, and variations in outcomes to understand the overall effectiveness of financial incentive strategies in enhancing tuberculosis notification practices. Whenever applicable, quantitative data was aggregated to calculate pooled effect sizes, employing meta-analytic techniques.

RESULTS

The initial database search identified 2,193 records. After removing duplicates, 1,127 records were screened for eligibility based on titles and abstracts and 197 were subsequently assessed for full-text eligibility. Ultimately, 93 records met the inclusion criteria for this systematic review (Figure 1).

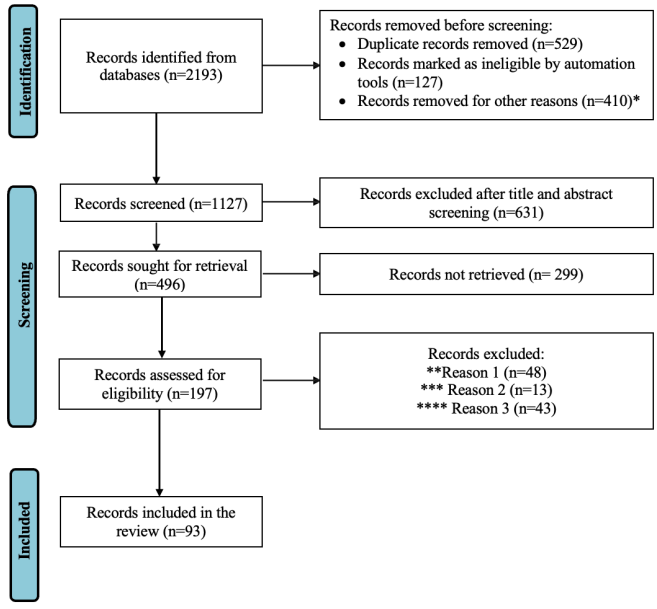

Fig 1: Prisma flow diagram displaying the process of selecting studies for the systematic review

**Other reasons include conference abstracts, protocols, grey literature without full text availability.*
***Reason 1: Studies do not provide original data. Reports was editorial letter and opinions.*
****Reason 2: Studies conducted outside of primary care setting.*
*****Reason 3: Studies not published in English.*

Study characteristics

The included studies varied significantly in design, sample size, and types of incentive strategies implemented. The majority of the studies (67%; n=62) were RCTs, while others included cohort studies, quasi-experimental designs, and qualitative studies. Sample size ranged from 10 to 300 participants, with a total of 15,000 participants across all studies. Various financial incentives were examined, including cash payments, bonuses for meeting predefined targets, and performance-based incentives tailored to specific health outcomes. The studies encompassed both independent practices and primary care clinics, with participants primarily comprising medical doctors. Table 1 summarizes the findings of 5 key studies, noted to be the most relevant in terms of intervention approaches.

Table 1: Key papers on incentives and social models for improving tuberculosis notification

Author(s)	Year	Country	Study Focus	Key Findings
Sun H, Wang H8	2024	China	Data-driven incentive mechanism design for chronic disease prevention from the perspective of government	Effective incentive mechanisms are crucial for chronic disease prevention, emphasizing data-driven approaches
Yip WCM, Hsiao WC, Meng Q, Chen W, Sun X9	2020	China	Realignment of incentives for health care providers in China	Realigning incentives is necessary for improving healthcare provider performance and patient outcomes in China
Banu S, Haque F, Ahmed S, et al10	2023	Bangladesh	Social Enterprise Model (SEM) for private sector tuberculosis screening and care in Bangladesh	The SEM framework improves access to tuberculosis screening and care, enhancing community engagement
Vo LNQ, Codlin AJ, Huynh HB, et al11	2023	Vietnam	Enhanced Private Sector Engagement for Tuberculosis Diagnosis and Reporting through an Intermediary Agency in Ho Chi Minh City, Viet Nam	Private sector engagement through intermediaries can improve tuberculosis diagnosis and reporting
Lee S, Lau L, Lim K, Cole D12	2019	Filiphina	Impact of health seeking behavior of Tuberculosis patients	Incentives improve health seeking behavior of Tuberculosis patient in access prompt treatment.

Quality assessment

The methodological quality of the included studies was assessed using the Cochrane Risk of Bias Tool for RCTs and the Newcastle-Ottawa Scale for observational studies. The results indicated that most studies had a low risk of bias. Weaknesses in methodology included small sample sizes, lack of blinding, lack of randomization and inadequate control groups. Inconsistent measurement approaches including a lack of standardized outcome measures made comparisons between studies challenging and may have impacted the overall synthesis of findings. Additionally, short follow-up periods in many studies limited the evaluation of long-term effects of financial incentives on tuberculosis notification practices.

Outcomes

The analysis revealed that financial incentives significantly improved tuberculosis notification practices among healthcare providers. Notification rates increased by an average of 10.7%, with incentives effectively motivating providers to adhere to notification protocols. The financial incentives led to a positive behavioral change among providers, improving their adherence to preventive care guidelines, which in turn led to improved patient outcomes. While some studies found that the improvements in notification rates persisted several months after the removal of financial incentives[2,5], others reported a decline in notification rates once the incentives were withdrawn, highlighting a dependency on financial rewards[4,6]. Additionally, factors such as ongoing administrative support, the integration of reminder mechanisms, and a culture of accountability within healthcare settings played crucial roles in sustaining these improvements.

Synthesis of findings

The synthesis of findings highlighted several key themes across the included studies.

1. Effectiveness of Financial Incentives: Financial incentives positively influenced healthcare provider behavior, particularly when coupled with reminder systems and administrative support.
2. Variability in Results: While many studies reported favorable outcomes, some exhibited variable effectiveness based on the types of incentives, emphasizing the need for tailored approaches based on specific contexts.
3. Limitations: Despite promising results, several studies indicated limitations, such as short follow-up periods and challenges in generalizability due to the specific populations studied.

DISCUSSION

The findings from this systematic review underscores the critical role that financial incentives can play in enhancing healthcare performance, particularly in the context of TB notification and management.

Impact of financial incentives on healthcare performance

Financial incentives are widely recognized as a powerful tool to motivate healthcare providers. It was found that healthcare providers who received financial rewards for meeting TB diagnostic and reporting targets exhibited a marked increase in cases detection and timely notification of these cases to authorities, aligning with value-based care principles which prioritize quality and outcomes over the volume of services provided[12]. Additionally, a meta-analysis highlighted that incentive programs

tailored to address specific challenges faced by providers in low-resource settings could substantially improve healthcare service delivery[13]. Such initiatives not only enhance provider motivation but also promotes a culture of accountability in patient care.

Barriers to effective implementation

Despite clear benefits, several barriers hinder the successful implementation of financial incentive programs. Economic constraints remain a formidable challenge, particularly in low- and middle-income countries with limited healthcare budgets. Fainman E et al. discussed how financial constraints can restrict health systems' ability to maintain consistent and adequate incentive structures, resulting in discontinuity in care and reporting practices[14].

Additionally, the resistance of healthcare providers to adopt new compensation models also poses a significant challenge. A qualitative study by Hadian M et al. revealed that many providers preferred traditional pay structures due to their perceived stability and predictability[15]. Thus, any initiation of performance-based incentives must address these concerns through education and a gradual transition.

Role of data-driven approaches

Incorporating data-driven methodologies into the design of incentive mechanisms can enhance their effectiveness. Data analytics helps identify specific areas for performance improvement, enabling the development of more effective and tailored incentive programs[16]. Such strategies can result in more sustainable incentives with desired health outcomes.

Furthermore, real-time data collection and analysis facilitates the continuous monitoring of TB cases, ensuring timely responses to emerging outbreaks. This proactive strategy can strengthen public health interventions, mitigate the public health impact of TB and enhance the overall responsiveness of the health system.

Cross-cultural considerations

The successful implementation of financial incentives requires a deep understanding of the cultural and contextual factors influencing healthcare delivery. Incentive strategies must be tailored to fit the local healthcare landscape, taking into account socio-economic factors and existing healthcare practices[17]. For instance, in cultures where traditional practices prevail, introducing performance-based incentives may require careful negotiation and engagement with community leaders and stakeholders to ensure acceptance and cooperation.

Cross-country comparisons reveal that the effectiveness of financial incentives can vary significantly depending on the prevailing healthcare system and socio-economic conditions. A comparative study highlights how different incentive models perform across diverse cultural contexts, suggesting that a one-size-fits-all approach may not be effective[18]. This underscores the importance of local context in the implementation of incentive programs.

Future directions

Moving forward, research should explore innovative approaches to develop financial incentives that align with the evolving healthcare landscape. For instance, incorporating digital health solutions, such as telemedicine and mobile health applications could enable remote monitoring and reporting of TB cases, thereby enhancing the effectiveness of incentive programs[19]. Furthermore, engaging patients in the incentive structure by offering rewards for compliance with treatment and reporting may create a more holistic approach to TB management.

CONCLUSIONS

In this systematic literature review, we examined various incentive strategies implemented to improve health reporting and healthcare service performance. Analysis of 93 studies indicated that well-designed financial incentives, such as pay-for-performance models and data-driven approaches, effectively enhance the engagement of healthcare providers in the private sector. Although the success of these strategies varies depending on local contexts and existing health policies, strong evidence suggest that adaptive and well-integrated incentives can positively contribute to public health improvements.

These findings provide valuable insights into how financial incentives can be used to strengthen disease reporting systems, particularly for tuberculosis, which often experiences under-reporting. Our review also highlights that system support strengthens the impact of these incentives, thereby creating a more supportive environment for reporting and managing diseases.

Recommendations

Based on our findings, we propose the following recommendations:

1. Further research is needed to explore the long-term impacts of different incentive mechanisms, especially in countries with diverse healthcare systems. Such research should take into consideration cultural and local health policies that may influence the effectiveness of incentives.
2. Policymakers should involve various stakeholders in both the design and implementation of incentive programs. Engaging healthcare providers and the community as stakeholders is crucial to ensuring that the programs launched are relevant and effective.
3. Governments and health institutions should implement more flexible and responsive policies based on local needs, using data to continually evaluate and improve existing incentive programs.

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AUTHORS CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

ST: Concept, design and manuscript preparation

IAA: Literature review, manuscript preparation

H: Literature review and analysis

Authors agree to be accountable for all respects of the work in ensuring that questions related to the accuracy and integrity of any part of the work are appropriately investigated and resolved.

CONFLICT OF INTEREST

None

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