Implementation strategies to performance-based non-financial incentive intervention for better data quality and use: the case of resource-limited settings, Northwest Ethiopia

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Abstract

Background: Evidence showed that incentive motivates health workers and improves health-related data quality and use. However, proven interventions, including incentives, may not always improve data quality and use due to context differences. In this regard, how performance-based non-financial incentive (PBNI) improves health-related data quality and use is unclear in Ethiopian settings.

Objective: The study aimed to develop strategies for implementing PBNI to improve health-related data quality and information use in northwest Ethiopia.

Methods: The study was implementation research that employed a qualitative design to improve data quality and information use among individuals, departments, and health centers through PBNI intervention. It was conducted in Wogera district, northwest Ethiopia, between October 2020 and July 2021. First, potential barriers and facilitators of implementing PBNI were identified through discussion meetings, observations, and interviews. Then, potential strategies that were helpful to overcome the barriers and capitalize on opportunities were identified and implemented in an iterative and tailored manner for six months until data quality and information use were sufficiently improved cost-effectively.

Results: The use of multi-layered methods to measure the performance of potential awardees and the creation and regular use of the data-day platform to recognize best performers and make constructive discussions about health-related data quality and use with higher officials were some strategies employed in the implementation research. The other strategies employed were also to show the performance evaluation process and results of health workers transparently and publicly during the data-day and reaching out to all potential awardees fairly and equally when there was important information to communicate. In addition, utilizing the culture of transparent, professional, and constructive peer-to-peer criticism among staff members during the review meetings and data-days and building their trust in the research team were a few strategies employed and resulted in improved data quality and use.

Conclusions: The improved health-related data quality and information use after implementing PBNI with a reasonable cost was the effect of utilizing strategies mentioned in the results section through the data-day platform, transparent and multi-layered performance evaluation methods, and the strong directive messages from higher officials during the data-day take the lions share. [*Ethiop. J. Health Dev.* 2023;37 (SI-1)]

Keywords: Model strategies, barriers and facilitators, incentive, data quality, and information use

Introduction

In the last few years, data quality has become the center of the health systems debate, not only because of its importance in promoting high standards of patient care but also its massive impact on the government budget for the maintenance of health services (1).

An enhanced Health Information System (HIS) is fundamental in measuring and improving the quality and coverage of health services. Reliable and timely health information is crucial for operational and strategic decision-making that saves lives and improves health (2). Making healthcare data available and using it for clinical practice and administrative decision-making is an essential but neglected step to improving the performance of leaders and practitioners during their decision-making (3).

Ethiopia has been implementing multiple strategies to enhance the performance of routine HIS at different healthcare delivery levels as per the World Health Organization guidelines (4,5). However, the healthcare data quality and use remain low and are challenged by several factors from inside and outside the health systems (3,4). For instance, the average level of baseline information used for the Wogera district was only 33.4% (4).

Theories and empirical evidence elucidated the positive effect of incentives on health workforce motivation. Evidence in the United States and Ghana indicated that

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performance-based incentives significantly improve patient care experiences and the motivation of nurses and midwives (5,6). Despite the availability of theoretical and empirical evidence of incentives for data quality and information use, no model strategies have been found to improve the challenges mentioned above in Ethiopia.

Despite implementing multiple strategies by the Ethiopian Government to improve data quality and information use, the result is unsatisfactory. Relying on the current status is not promising in addressing challenges and letting the problems challenge the healthcare system for more extended. Regarding our knowledge and research findings, there is no locally developed and tested PBNI model strategy in Ethiopia to improve the problems. Besides, this can be taken as a lesson to develop other models that can be cost-effective, adaptable, and easily scalable to the different local contexts of Ethiopia. Therefore, this paper aims is to develop a PBNI model strategy to improve data quality and information use in the Wogera district and provide recommendations for future scale-up in other areas.

Methods

Methodological context description

This study is part of extensive implementation research that answered different interlinked research questions. One of the research questions was about identifying the barriers and facilitators influencing the implementation of PNBI for better data quality and information use (7). The other research question was about the investigation of the implementation outcomes in terms of coverage, effectiveness, adoption, implementation (fidelity), and maintenance (sustainability) of the intervention (8). Thus, this paper aimed to bridge the two research questions, and the linking process was done by examining and identifying the implementation strategies that could help us overcome the implementation barriers so that the implementation outcomes would be improved significantly.

Because of the strong linkage among the research questions in the extensive research project, the methods employed to answer these questions were predominantly interlinked or the same. Specifically, the study participants, sample size and sampling procedure, data collection and quality assurance, and ethical issues were also the same. Therefore, similar details of these methodological components can be obtained from the other studies (7-10); however, valuable components are described below so as not to harm the completeness of the methodological content of this particular study. Besides, the methods of this implementation research are presented in two subsections: under the subtitle research methods and implementation methods.

Research methods

Study setting and period

The study was conducted in Wogera district located in northwest Ethiopia. It has about 51 kebeles ,the lowest administrative unit in Ethiopia, 8 HCs, and one general hospital. The study is conducted between October 2020 and July 2021. Further information about the district's population, ecological characteristics, health facilities, and health workforce is detailed elsewhere (9).

Study design

The study used a phenomenological qualitative study design by combining the qualitative components of the barriers and facilitators study (7) and the implementation outcome study (8). This was because, to determine helpful implementation strategies (these are the answers to the research questions of this particular paper) that led to improved implementation outcomes, first, it was necessary to identify implementation barriers and facilitators. To this effect, the lived experience of implementers was assessed with a phenomenological design. Therefore, the implementation strategies were the bridges between the answers to the research questions related to barriers and facilitators and implementation outcomes.

Participants, sample size and sampling procedure

The implementation research on which this study was based had two types of participants: participants exposed to the intervention and participants of the implementation process. The participants exposed to the intervention (PBNI) include health workers (individuals), departments (case teams), and health centers in Wogera district and are the targets for the implementation research. Moreover, the participants of the implementation process, however, involved individuals from different offices. Thus, staff from the federal Ministry of Health, Amhara Regional Health Bureau, North Gondar Zone health department, Wogera district administration (head) participated in giving directive measures based on critics and concerns about health data quality and information use among all health workers attending the health data-day celebration.

The research participants, sample size and sampling procedure used for this paper were the same as that of the qualitative participants in assessing the barriers and facilitators of implementing PBNI (7). The qualitative data about the barriers and facilitators (which were the basis for designing implementation strategies) of implementing PBNI were obtained from Wogera district health system both formally (in regular meetings, data-days, and in-depth interviews) and informally (information obtained incidentally from any communication or observation) starting from the initiation of the implementation research. In-depth interviews with 13 participants were conducted in the summative evaluation when the PBNI intervention was completed after six months. Therefore, the study participants in the summative qualitative study included purposefully selected heads of health centers, focal persons and officers from the district health office, and the district health office head. However, the informal data collection process included any health worker in the district and observations from field visits starting from the initiation of implementation research.

Data collection methods and procedures

The barriers and facilitators of implementing PBNI which were the basis of designing implementation strategies were obtained through brainstorming and discussions in the review meetings and data days, observations and in-depth interviews with purposively selected study participants. Therefore, the research team prepared a log of information about the barriers and facilitators of the implementation process in a continuum manner during the whole implementation period.

In the in-depth interview, the data collectors were master's degree holders with ample experience in qualitative data collection and research. They were trained for a day about the data collection procedure and its content using an interview guide. An open-ended interview guideline was prepared and used during the summative assessment to facilitate the data collection process. All interviews were tape-recorded, and the in-depth interviews ranged from 33 to 64 minutes.

Data quality assurance

Efforts were made to maintain the credibility, transferability, and dependability of the findings to maintain the trustworthiness of the study. Specifically, to ensure the study's credibility, efforts were made to develop the trust of interviewees in the data collectors by helping them understand the study's significance and using well-experienced data collectors with close and supportive supervision. To ensure the transferability of the study, tick descriptions were provided in the methods and results sections.

Finally, all procedures, findings, and decisions made were documented to ensure the dependability of the study's dependability. Furthermore, the qualitative data were shared with colleagues to get peer feedback and check the confirmability (neutrality) of the analysis and its interpretations.

Data processing and analysis

The qualitative data about the barriers and facilitators of implementing PBNI were the basis for the analysis. The research team and stakeholders analyzed these qualitative data (barriers and facilitators) to understand the nature of the associated problems. After a thorough discussion, appropriate implementation strategies were identified to overcome the barrier and capitalize on the opportunities for better implementation outcomes. After identifying the implementation strategies, the implementation resumes and evaluations were made to check whether the strategies could lead to improved outcomes. However, if the challenges of implementing PBNI persisted, further analyses would be conducted (maybe by including fresh data) so that either modification or changing of the strategies could be performed accordingly. These would continue iteratively in a tailored manner until practically significant improvements in implementation outcomes are registered.

Implementation methods

Awardees selection procedures

Individuals, departments, and health facilities were incentivized based on their performance. They were measured based on the quality of the data they generated and used. The data use was measured with five domains providing feedback, evidence-based decision making calculated health coverage, identifying indicators, and target versus achieved estimates. A few of the indicators that were used to measure information use were "whether performance gaps are identified by comparing achievement against target", "whether root cause analysis is done for low-performing key indicators", and "whether an action plan is prepared for the identified priority problems/challenges."

On the other hand, data quality was measured with three items' domain:, timelines of reports on data elements, completeness of data elements, and accuracy of reports. Each of these domains has the respective indicators; for instance, "Completeness" has "proportion of data elements filled in the source documents" and "proportion of reportable data elements completely reported". Similarly, the domain "Timelines" has indicators including "reports sent to health information technologist within 20^{th} to 23^{rd} of the month."

Unlike case teams and health centers, individuals who could be awarded were large in number. To maintain cost-effectiveness, we identified the individuals who deserve awards in two stages: in the first stage, they were compared qualitatively (with judgment) to select a few who performed better in data quality. In the second stage, the performances of only those who were screened were evaluated quantitatively (objectively) to identify or rank the best performers.

Thus, in the first stage, the qualitative assessment to identify best best-performing individuals was conducted using three approaches: In the first approach, the head of the district health office was requested to select 12 individuals out of all health workers in the district (globally) who were best performers in data quality and information use during the two months prior to the date of the interview. In other words, the best performers were selected among the health staff in the district based on the officers' qualitative judgment of health workers' performance in data quality and information use. In the second approach, the district health planning officer was requested to select the two best performers from each health center based on his qualitative judgment or observation. In the third approach, the head of each health center was requested to rank the two best performers in the respective health center. Then, the implementers and researchers from the University of Gondar examined the whole information from the three approaches and took those health workers selected by all three approaches for further performance evaluation using the quantitative approach (second stage).

In the second stage of evaluating individuals' performance, the quantitative evaluation was performed considering the health data quality the commonly selected individuals generated. This was performed by reviewing the documents they worked with in the two consecutive months prior to the date of data collection and were ranked accordingly. This was performed in the performance evaluation of individuals during the first round (or the first two months). In the second and third rounds, the same procedure was followed, except the number of individuals selected from all health workers (globally) increased from 12 to 18, and each health center (locally) increased from two to three.

The performances of health centers and departments were assessed only quantitatively by assessing their past two months' data quality generation and use. In addition, unlike individuals, all the health centers and departments in the district were evaluated only quantitatively. Thus, those who scored the highest in each of the three rounds were incentivized among six health centers. The same procedure was followed in evaluating performance and incentivizing the case-teams. Therefore, this evaluation was conducted three times throughout the implementation period.

Intervention

The intervention of the implementation research was PBNI. The intervention began with awareness creation about the PBNI in a review meeting conducted in Wogera district. Then, banners describing the types of non-financial incentives (scholarship, computer, television, power bank, hard disk, and flash) that were rewarded based on their performance were prepared and displayed in each HC. Besides, the information was disseminated using group telegram channels. All these modalities were to disseminate the information effectively so that everyone, the case-team or health center, would be motivated and improve data quality and information use. After two months of information dissemination, quantitative data about data quality and information use were collected from all health centers, case-teams, and individuals screened using the judgmental (qualitative) approaches mentioned in the awardees selection section above. Using this quantitative assessment, the performances of individuals, case-teams, and health centers were evaluated and awarded accordingly. The same procedure was followed to measure data quality and information use in the remaining two phases, which were conducted every two months.

Considering the nature of sustainability and adaptability, recognition/certification, awarding, and scholarship were applied under a non-financial incentive intervention package. Participants in this study, such as HCs, case teams, and individuals, were rewarded iteratively in three rounds within six consecutive months following the intervention for their higher score achievement. During data-days, certification ceremonies were prepared, and awardees received certificates from the hands of governmental officials. Moreover, higher officials recognized the awardees publicly, and key messages were delivered to keep up their excellent work on quality data generation and use. In addition, candidates who did not get the chance of being awarded were also advised to learn from the best experiences of awardees in quality health data generation and use. Finally, the University of Gondar, technically a supporting agent of the intervention, pledged to provide scholarship opportunities in collaboration with the Ministry of Health for those who scored high performance throughout the implementation periods.

Non-financial incentives

Health facilities scoring the highest among those who have scored 90 and above were awarded a television or desktop computer based on their interest. Other health centers that scored 90 and above but didn't receive television or desktop computers were certified for their high performances.

The first two case teams across all health facilities, with a total score of 90% and above, were rewarded with a desktop computer or hard disc as needed. However, the rest of the case teams, which scored 90 and above but did not receive a computer or hard-disc, were certified for their high performance. According to the criteria, the first five health workers who scored 90% and more were certified, and these high-performing health workers were also rewarded power bank or flash disc as per their interest.

At all levels, health centers, case-teams, and health workers who scored 65-90 points were recognized publicly and obtained thank-you certificates from the hands of higher officials from MoH. Scholarship opportunity was awarded to the most outstanding health worker persistently scored across the assessment's periods.

Implementation outcome

Implementation outcomes for the intervention PBNI were assessed using the REAIM framework, which stands for Reach, Effectiveness, Adoption, Implementation, and Maintenance. It is a framework to evaluate the implementation outcome with five components. These components include the reach or the coverage of the implementation research in the district, the effectiveness of the intervention concerning data use and data quality, the readiness of health facilities to adopt the implementation, the extent of implementation as per the guideline set on priori, and its sustainability. The detail is presented in the other part of the extensive research (8).

Intervention outcomes

Information about data quality and use was collected and analyzed every two months. Data quality was assessed considering the dimensions of timelines, completeness, and accuracy. Accuracy of the data was computed using the selected vital indicators such as ANC first visit, family planning new and repeat, skilled birth attendance, malaria confirmed cases, HIV+, and under-five year children with pneumonia by verifying the record on registers and tally sheet and the report. The level of data quality was determined as accurate, over or under-reporting according to the national data

quality acceptance range of 100±10 (11). On the other hand, Information use practice at the facility level was computed based on information use criteria such as providing feedback, evidence-based decision-making, health coverage calculated, identifying indicators, and target versus achieved estimates.

Selection of implementation strategies

In order to enhance the effect of PBNI and its sustainability on data quality and information use, numerous implementation strategies were executed. These implementation strategies indicated the how part of the intervention that will help deliver the evidence-based intervention to get the desired outcomes.

To select appropriate implementation strategies, the research and implementation teams held a meeting during the planning phase to brainstorm the possible implementation process determinants. Guided by the Consolidated Framework for Implementation Research (CFIR) framework, the barriers and facilitators were identified. These determinants would help the team select the appropriate implementation strategies such as establishing the university, implementer, and stakeholder forum to implement the model smoothly. The forum would comprise the university as a technical support and research team, regional and district health offices as an implementer, and the Federal Ministry of Health as a donor. The multidisciplinary team forum would provide directions and guidance for the facilities. Additionally, data celebration day and the engagement of government officials were identified as part of the implementation strategy.

The implementation strategies would be revised according to their effectiveness in improving intervention outcomes iteratively. Changes can also be tailored if other or unexpected barriers are identified during the implementation process.

In a data day celebration, the best performers were acknowledged, and the participants shared best practices. Engaging zonal and local government officials helps to create a sense of ownership and mobilize local resources for the implementation of the model. Finally, different communication strategies, including virtual communications (group telegram) were employed to implement the model correctly.

Assumptions

The development of the PBNI model considered several assumptions that can improve its effectiveness. The basic assumptions were the government commitment, availability of functional health facilities, sufficient human resources, and budget. The Government of Ethiopia has clearly elucidated its commitment to data quality and information use by placing the information revolution as a priority agenda in the first and second phases of the Health Sector Transformation Plan (HSTP-2). Necessary information communication technology (ICT), reporting tools, and physical infrastructures are also crucial. Finally, all government policies and guidelines should be available to implement effective model strategies.

Ethics approval and consent to participate

Ethical clearance was secured from the University of Gondar Review Board. In addition, permission to conduct the research was obtained from the district health office, and oral informed consent was obtained from each study participant. The data collected was kept anonymous using codes to avoid any indication of personal characteristics. The data were stored in repositories of the University of Gondar and the Ethiopian Ministry of Health, and it is prevented from any access to unauthorized persons.

Results

Implementation strategies that are used in the PBNI intervention are the results of this implementation research. These implementation strategies were determined after identifying what works and what does not during the implementation process. Thus, the results of this study were those strategies that resulted in better implementation outcomes. The strategies also include the coping mechanisms for the failure of some of the assumptions taken during the initiation of the implementation research. The set of strategies was themed under the determinants (factors) generated from the CFIR framework's components. In other words, the strategies were grouped under the determinant designed to overcome (if the determinant is a barrier) or capitalize on (if the determinant is an opportunity).

The barriers can, for example, be related to the intervention itself, which is one of the five components of the CFIR framework. Therefore, strategies that can be employed to overcome these barriers would be grouped under the theme of intervention. Similarly, strategies that were devised to overcome barriers (capitalize on opportunities) that are related to other components of CFIR, namely the implementation process of PBNI, inner setting (the health system in the district), outer setting (institutions or organizations other than the inner setting), and individuals involved in the health system (e.g., those who have positions or critical role in the HCs) would be grouped in the respective theme. Thus, the themes include Intervention, Implementation, Inner-setting, Individual, and Outer settings, and the results (strategies) under each of these themes were discussed as follows.

Intervention

One of the health workers' concerns related to the Intervention (PBNI incentive) was the doubt they had about the fairness or impartial treatment of all potential awardees. This concern is related to the fact that the intervention is an incentive that might be given to those who do not deserve it. It is obvious that unless the evaluation of the performance of health workers, case-teams, and HCs is not genuine and trustable, its negative effect might outweigh its significance. To overcome this reasonably acceptable concern related to the Interventionintervention, the implementation and research team clarified how their performance would be measured. The team also informed that the evaluation process and the results would be transparent and reported publicly so that they would develop trust in it. The participants had developed trust in the whole

process and evaluation results when they saw it implemented according to what the team had planned and disclosed on priority.

During the implementation, the research team developed a concern related to the intervention in that motivation after monetary incentive may not stay long or be sustained. This may be convincing because money be utilized for various consumptions leaving nothing to recall about the incentive. Therefore, it was decided and implemented to offer incentives in-kind rather than money so that awardees ould recall every time about the recognition, which could motivate them toperform moree.

Implementation process

In this theme, only those strategies employed to overcome barriers (or capitalize on opportunities) related to the implementation process are considered. Specifseuiically, the implementation process is concerned with the planning, engagement, and activities that would be executed during the implementation process, and strategies that would be employed to overcome challenges (or capitalize on opportunities) related to these process components will be discussed in this theme.

Starting from the initiation of the implementation research, the team thoroughly discussed the reliability and validity of the evaluation method that would be employed to measure the performance of staff, case-teams, and HCs. All the case-teams and HCs were evaluated only objectively or quantitatively. However, comparing staff performance validly and reliably is a challenging task, and to alleviate the problem, the team designed and implemented different technical measures at different stages. Thus, health workers were evaluated with respect to different dimensions to triangulate one performance information from one source with another from another. In this regard, the evaluations of health workers were carried out by two approaches, as mentioned in the Methods section under the sub-title Awardees selection (the qualitative and quantitative approaches). The qualitative method uses three approaches: evaluated globally (all HCs considered together) by selecting 12 individuals in the first round from all HCs (both by the head of the district health office and planning officer) and two from each health center (i.e., locally). The selection of the two best performers from each health center was performed in two ways: the head of the district health office and planning officer, and the other was by the head of the respective HCs. Finally, those commonly selected by all three judges were evaluated quantitatively by considering their performance in the past two months.

However, the selection of only 12 health workers in the first round raised a reliability concern because candidates not commonly selected by all three evaluators may have better performance as their respective data were not analyzed. To overcome this concern, the sample size screened by the global approach was increased from 12 to 18 in the second and third rounds, and this was true for the three evaluations, with 18 health workers in the global selection and three per health center selected independently by the head of each health center as well as a planning officer and head of the district health office. In addition, to collect and analyze quantitative health data for individuals, all the nominated health workers by any evaluators were considered for the quantitative evaluation.

In addition, variations in the number of indicators to evaluate the performance of individuals or case teams across departments ere another valid measure. For instance, some case-teams or the respective staff may be evaluated by many indicators, while others have a minimal number of items. Those candidates who are evaluated by a small number of indicators can quickly get or lose all or a considerable number of points. Therefore, a variable called “proximity to data quality and information use,” describing the proximity of case-teams and individuals to health data-related activities, was considered by allocating specific scores to this variable out of 100%. Thus, it was used to evaluate each case-team or individual by taking the ratio of the number of indicators for that particular case-team (or individual) divided by the maximum number of items identified for all case teams (or all individuals) multiplied by the score allocated for the indicator which was 15%.

Recognition/incentives motivate staff more when offered publicly and officially than just offering the incentives informally or individually. At the same time, staff/public gatherings create an opportunity to address messages and directive measures to the staff and carry out constructive criticism among health workers. To capitalize on these opportunities, the implementation research team created a platform of “health data-day” on which higher officials can address incentives and some constructive messages and directive measures.

Inner setting

The inner setting is related to the culture, structure, and network of all health facilities in the district that could influence the implementation of PBNI. In this regard, it was the concern of the research team and potential awardees that the potential implementers might not get information and updates about the intervention and PBNI equally. If such information gaps were created, beyond raising the concern of fairness, it would bias the effect of incentives on intervention and intervention outcomes. Therefore, to effectively disseminate the information, the team used the pre-established group telegram to communicate information related to the implementation. In addition, the team moved across HCs to disseminate relevant information to health workers and displayed banners that promoted the types of awards.

The periodic review meetings platform of the district health office also created opportunities for better implementation. To capitalize on the platform, the research and implementers team used the periodic review meetings to communicate useful information, schedules, and updates related to implementing PBNI.

Individuals

Among the individuals, few staff in the district health office were not vigilant or considered the implementation process their responsibility. They gave less attention to it, and emphasis was given only to political and routine health services and reporting practices rather than the efforts of the implementation. This might negatively affect the whole implementation process. To cope with such bottlenecks or failure of assumptions, hot and transparent discussions and constructive criticism were carried out in the data days and the review meeting platforms. Simultaneously, higher officials from the MoH, Regional Health Bureau, and Zonal Health Department were invited and delivered strong directive messages. In those meetings, the higher officials clearly and strongly notified the staff that generating quality health data and utilizing it for routine activities is one of the government's primary concerns. This particular challenge was related to the assumption that the research team took as a high government commitment. However, as disclosed above, the assumption did not hold, and even if that was not the case, the team tried to overcome the challenge.

Though one of the assumptions of this implementation research was related to the availability of staff, there was staff turnover experienced during the implementation process. The main challenge related to staff turnover is the difficulty of getting trained personnel in the field of the one who left the office. In consultation with the district health office officials, the research team tried to replace or delegate appropriate persons with the provision of some training when necessary.

Outer setting

In some HCs, there were cut-off electricity and networks for a relatively long time, hindering the performance of health workers, case-teams, and HCs. To overcome such challenges, the team encouraged the staff to use solar energy or work offline and send the outputs when connected or through manual or physical transport.

Moreover, the breakdown of conflict and security problems in and closer to the implementation district was another challenge for the implementation. In such conditions, applying a similar dose or intensity of intervention across the health facilities was almost impossible because of variations in security concerns. As a result, in the extreme cases, the team excluded two HCs that were directly under the war condition, and for others, it was implemented with the support of local securities. Some of the challenges related to the outer settings are generally due to the assumptions that failed to hold. This might include the assumptions that were taken by the research team on priori, such as the availability of functionality of health facilities and service provisions.

Discussion

To the best of our knowledge, this is the first study done on implementation strategies for the effect of PBNI on data quality and information use in Ethiopia. Another paper, which is complementary to this particular study, showed that the impact of the intervention (PBNI) on data use was 21.6% ($p < 0.01$). The data quality was also improved significantly for different selected indicators (9). For these favorable results to come, different implementation strategies were developed pragmatically and iteratively. Several modifications were made to provisional strategies in a tailored manner until context-based implementation strategies that lead to better outcomes are identified. However, these strategies may work in other settings if the potential scaling-up areas have similar contexts and fulfill the assumptions in this implementation research.

Sometimes, implementing as per the model developed may not guarantee better outcomes because there are some contextual factors could affect the results (12). However, the scaling-up sites should fulfill the minimum amount and type of resources utilized in the current implementation area. There was committed management during the implementation, especially at a higher level such as the zonal, regional, and Ministry of Health.This might have probably compensated for some of the gaps observed at the distinct level through the motivational speeches and constructive messages delivered by the higher-level managers to health workers on those data-days. The commitment of health information technology workers and health staff should also be maintained (13). However, during the intervention period, there were security concerns in and around the implementation district, which might not be the case in the districts where it will be scaled up; in this regard, better program outputs could be easily achieved in the scaling-up areas where there are no such challenges (14).

The implementation strategies such as arranging data-days, promoting PBNI using banners and other small meetings, and using telegrams have brought significant change in data quality and information use in the rural Wogera district. Here, it does not mean that other strategies cannot be effective. However, for rural districts such as Wogera, these strategies seem feasible regarding accessibility, availability, and acceptability of the implementation process. As we used multiple implementation strategies simultaneously, it may be challenging to figure out which strategies brought the change. However, the qualitative study indicated that the data-day platform has brought different actors into one room ,creating motivation for health workers because it creates a platform for them to be popular in a larger group(15). Of course, for successful data-days that create a platform to motivate the awards and other staff for future reward, the commitment of higher officials (13) and technical implementation research teams was important.

The intervention strategies to address the PBNI effectively improved the intervention outcomes. That means the award of scholarships, electronic equipment, and certifications motivated the health staff for better

intervention outcomes, namely data quality and information use. Here it might not only be the material value that motivated them; it could also be the ecstatic or moral value (16), that inspired them to work hard for better quality and timely health data report. The official recognition they got from the higher bodies through the strategies put in place, such as data-days, could boost their morale for better performance.

The strategies of PBNI would be acceptable to both the awardees and not awarded to staff, and the positive program outcomes would be sustainable if and only if the deserving awardees were identified and rewarded using credible techniques of evaluation (17). This may indicate that the health staff or the potential awardees had developed trust in the evaluation methods of their performance and its employment by the technical research team of UoG staff and other stakeholders working on the related activities. The trust was developed and nurtured after clear and transparent presentations made regarding the whole evaluation procedure (18).

Limitations of the model strategy

The intervention and implementation strategies were applied, and outcomes were measured only in six accessible health centers, or two health centers were excluded because of security concerns. This could be considered selection bias because the implementation and intervention outcomes could be improved relatively with more superficial efforts in the areas where this program was implemented. Of course, those rural districts with similar contexts can be considered for scaling up, and fortunately, a considerable number of districts in the country might be similar to the context of the implementation area.

Multiple implementation strategies were employed simultaneously, which may obscure the strategy that brought the change in implementation and intervention outcomes. However, the qualitative research figured out that the data-day platform, transparent and multi-layered performance evaluation methods, and the strong directive messages from higher officials during the data-day take the lion's-share of motivating the health staff for better program outputs. The other limitation of the implementation research was the failure to include health posts and health extension workers in the PBNI intervention, which could limit the generalizability or transferability of the findings of this study (19).

Conclusions

Under the assumptions of committed government officials, engagement of stakeholders, functional health facilities, and sufficient budget with the available financial, material, and human resources, the implementation strategies resulted in better outcomes in a resource-limited setting. Specifically, the data-day platform, the engagement of local administrators, and transparent, triangulated, and genuine performance evaluations of potential awardees are the most critical implementation strategies that lead to improved implementation outcomes for data quality and information use. Therefore, the implementation strategies can be utilized for further scale-up to improve the coverage, effectiveness, adoption, fidelity, and sustainability of the PBNI implementation. It is also recommended for future similar implementation research to consider the health pots or lower-level health workforce, such as health extension workers, as the target for motivation and subsequent outcome measurement. We also recommend further research to evaluate the reliability and validity of the performance evaluation methods employed for individuals, case-teams, and HCs.

Conflict of interest

Authors declared no any conflict of interest

Contributions

BT, LD, AA, TH, BF conceived and designed the study.
AM, MM, MA, TG, contributed significantly to the writing of the manuscript

Availability of data and materials

Data will be available upon the request from the corresponding author

Consent for publication

Not applicable

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