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ORIGINAL ARTICLE

CULTIVATING COMPETENT LEADERS WHO CAN MANAGE AND GOVERN THE HEALTH DELIVERY SYSTEM IN NORTHWEST ETHIOPIAN: QUASI-EXPERIMENTAL STUDY

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ABSTRACT

Introduction: *Nurturing leadership and governance is salient to strengthen health systems. However, literature that reports the effect of programs related to this, particularly in low and middle-income countries' health systems is limited.*

Aim: *To examine the effect of integrated health system leadership, management, and governance capacity-building program on institutional delivery performance.*

Methods: *A prospective quasi-experimental study, on one-hundred-thirty-four health facility teams,was conducted in northwest Ethiopia. Teams were allocated to intervention and control groups in a 1:1 ratio, non-randomly. Integrated leadership, management, and governance capacity-building program was employed in teams of the intervention group over six months. Using a challenge model, they implemented a six-month project on institutional delivery performance. The outcome of interest was mean institutional delivery performance. Data from each group were collected at baseline and end line. Data were analyzed using analysis of covariance. Statistical significance was determined at p-value<0.05. The program's effect size was reported using partial eta squared.*

Results: *Integrated leadership, management, and governance capacity-building program had a statistically significant effect on mean institutional delivery performance (p-value<0.001). The program's effect size was 65%.*

Conclusions: *Integrated leadership, management, and governance capacity-building program is a plausible cause of improved mean institutional delivery performance. The current findings could make the program sustainable across time and scalable across similar settings. To identify the program's true causation, further research could be done using a randomized control trial.*

Keywords: *Effect, Integrated, Leadership, Management, Governance, Institutional delivery*

INTRODUCTION

A strong health system is required to address universal health coverage (1, 2). Leadership and governance is identified as the health system building block that directly impact the health outcomes (3, 4). However, it remains challenging to implement and measure, particularly in low and middle-income countries' health systems (4, 5). Yet, nurturing this building block is salient to improve the health system performance and health outcomes.

This has enforced the development of integrated Leadership, Management, and Governance (LMG) capacity-building program (4, 6). Contemporarily, this program centers the integrated leadership, management, and governance for results framework (**Figure 1**).

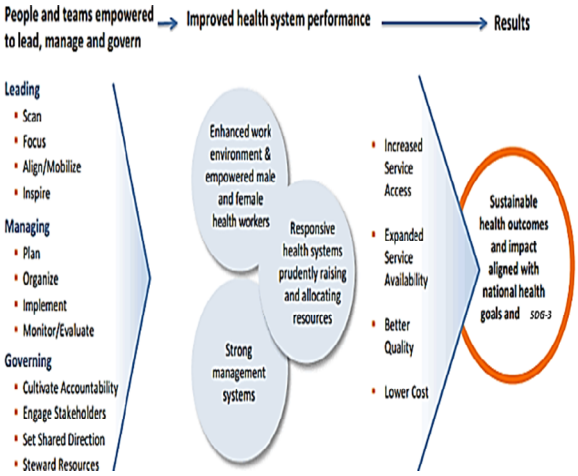

Figure 1: Integrated leadership, management and governance for results framework (Source: MSH, 2017)

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The practices of the three paths indicated in **figure 1** are highly interdependent and mutually reinforcing constructs in the context of health (5, 7). Thus, interacting with each of the practices in a balanced way is important to achieve better results.

Integrated LMG capacity-building program has been deployed in a considerable number of low and middle -income countries' health systems including Ethiopia (3). Despite this enormous expansion, there is limited empirical literature on how the program improves the health system performance and thereby health outcomes (8-11).

The studies done in Kenya (9), Egypt (10) and Mozambique (11) reported that applying the leadership development program increased selected health-service delivery indicators by average coverage rate of 10%, 41%, and 10%, respectively. On the contrary, a study done in Afghanistan reported that the program had no statistically significant effect on health system performance, rather, many indicators worsened in the intervention group (8).

These studies examines the program that only centers either the leading and managing practices (9, 10) or the governing practices (8, 11). All of these studies used an average coverage rate of two and more health services as an outcome of interest. Most of them used a retrospective approach and lacked to use control groups (9-11). None of them did control the plausible confounding factors (8-11). Other studies showed that leadership is a requirement for effective governance and effective management (5, 6). Moreover, there is a recommendation to further researching the program's effect using a single outcome of interest (9). Therefore, the current study aimed at examining the effect of integrated health system leadership, management, and governance capacity-building program on institutional delivery performance.

METHODS

Theoretical Approach

The theory of change is the theoretical foundation of this study (12, 13). Theory of change refers to a systematic and cumulative study of the links between inputs, activities, outputs, outcomes, and context of any initiative (12). There are three identified attributes to achieve the potential of this theory: plausibility, doability, and testability (13). Plausibility refers to whether activities implemented should lead to desired outcomes. Doability reflects about availability of all resources to carry out the initiative. Testability explains the presence of specific and complete theory of change to track its progress in incredible and useful ways.

Linking between inputs, activities, outputs, outcomes, and context of the initiative is influenced by the competence of the people and teams to lead, manage and govern the health delivery system (6). As noted earlier, studies indicate that people and teams empowered to lead,manage and govern the health delivery system improved performance and thereby increased health outcomes (5, 9, 10). This shows that how developing one's competence to lead, manage, and govern the service delivery system is critical to achieve improved results. Anyone can further imagine the value of the integrated LMG capacity-building program when it is firmly grounded in the target population.

Study design and teams

This study was designed to be a prospective team-based (14) quasi-experiment, aimed at examining the effect of the integrated LMG capacity-building program on institutional delivery among health facility teams. Quasi-experiment is an empirical study design used to estimate the plausible causal impact of an intervention on its target population without random assignment (15, 16). The study was conducted among one hundred thirty-four health facility teams in northwest Ethiopia. Teams were allocated to intervention and control groups in a 1:1 ratio, non-randomly. Each team had three members. The team members in both the groups were intact and worked together over the intervention period. In all the 134 study teams, there were a total of 402 participants. **Table 1** indicates sex, age, residence, and service year of the study team members.

Table 1: Sex, age, residence, and service year of the study team members, Northwest Ethiopia, 2018 (n = 402)

Variable	Category	Frequency	Percent
Sex	Male	184	45.8
	Female	218	54.2
Age in years (mean = 32.6, SD = 5.5)	<25	4	1.0
	25-29	145	36.1
	30-34	135	33.6
	>34	118	29.4
Residence	Rural	239	59.5
	Urban	163	40.5
Service year in years (Mean = 8.6, SD = 4.8)	<2	15	3.7
	2-4	59	14.7
	5-8	150	37.3
	>8	178	44.3

Intervention

The integrated LMG capacity-building program was the intervention. This is a capacity-building program that has been endorsed by the Ethiopian ministry of health to empower health facility teams to lead people, manage tasks and govern organizations. It comprised of five modules: (I) Overview and context of the health system in Ethiopia, (II) Introduction to LMG, (III) Improving performance through enhanced LMG, (IV) Health facility resources management, and (V) Health service delivery management. The integrated LMG capacity-building program was deployed over six months in the intervention group.

Basic concepts that enable the teams to face challenges and achieve results were transferred with two consecutive off-site three-day workshops. Only nine to ten teams (twenty-seven to thirty participants) were recruited to a single workshop. Based on this, seven workshop cohorts were established to address all the intervention teams. The main task that the teams carried out in the first workshop was developing the six-month project on institutional delivery performance using a challenge model (6, 10) (**Figure 2**).

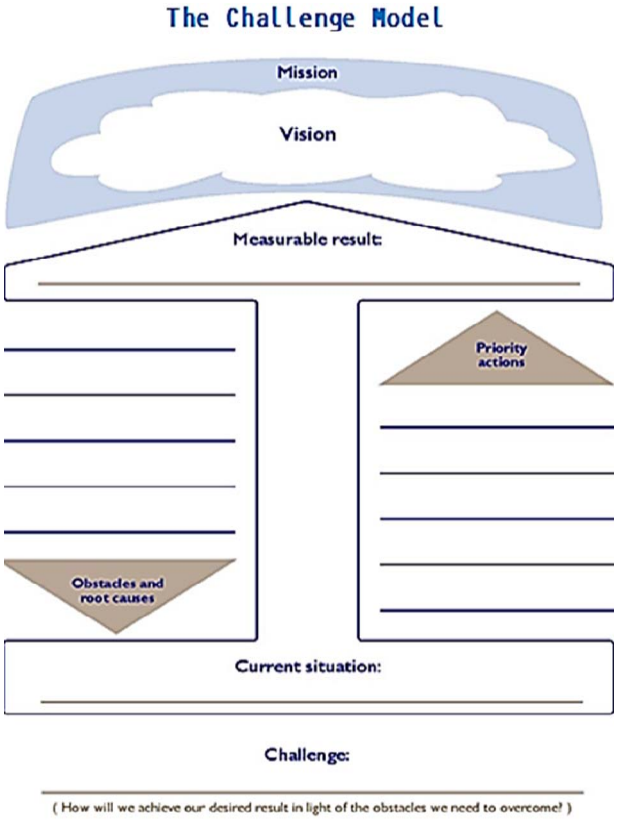

Figure 2: The challenge model (Source, MSH, 2017)

In line with the integrated leadership, management and governance for results framework (**Figure 1**), the challenge model was the key tool to track the plausibility, doability, and testability of the integrated LMG capacity-building program. Elements of this model that the teams worked out step-by-step were: reviewing facility mission, setting a shared vision, developing six-month measurable result on institutional delivery, assembling current institutional delivery performance (baseline), identifying obstacles and root causes, developing inspirational challenge statement, and designing priority actions to eliminate obstacles. In the meantime, each team identified key stakeholders to align and mobilize resources.

With all the above activities done, the teams went back to their working place, taking an assignment of validating the project with other staff and key stakeholders. For example, one of the major issues to be validated was the specificity, measurability, achievability, realisticity and time boundedness of the desired measurable result.

After an average period of one month, ensuring that the teams carried out their workplace assignments, they were called back for the second workshop. It began with presentations and discussions on the validated projects. Furthermore, the teams facilitated development of an action plan and monitoring and evaluation plan to implement the six-month project. Moreover, concepts of coaching, communication, managing facility resources, and health services delivery were discussed. In the end, they went back to their working place for the actual implementation of the projects.

In the next month, the facilitators' made an on-site coaching visit to each team using a structured coaching guide. They addressed issues like challenges faced, solutions taken and lessons learned. Facilitators were certified experts for integrated LMG in-service capacity building trainer of trainees from the Ethiopian federal ministry of health. Participatory, inquiry-based and practice-oriented facilitation approaches were employed.

Note that the control group was followed using the standard procedure.

Variables and measurements

Mean end line institutional delivery was the dependent variable, while the baseline institutional delivery was a covariate. Institutional delivery perfomance referred to the percentage of women who gave birth at a health facility.

It was a continuous scale variable measured by percentage. The expected pregnant women were denominators, while the women who gave birth at the facility were nominators. The main independent variable was the group. Note that any statement of mean institutional delivery performance in this study refers to the end line mean institutional delivery performance.

Data collection and analysis

Data were collected at baseline and end line using a checklist. Analysis of covariance was unlocked to analyze the data. Before the final analysis, five stages of analyses were conducted using the statistical package for the social sciences version 20. First, descriptive analysis was carried out to characterize the study teams and the ordinary mean institutional delivery performance. Second, assumptions of no presence of significant outliers, and approximately normally distributed data for each group were assessed by boxplot and Shapiro-Wilk test ($p<0.05$), respectively. Third, in the absence of the covariate, the effect of the group on the mean institutional delivery (dependent variable) was tested using analysis of variance. It gave significant result: partial eta squared (η^2) = 0.37, and p-value<0.001.

The η^2 measured the proportion of the total variance (effect size) on the dependent variable that was associated with the membership of different groups defined by a group (17). Fourth, the group-covariate interaction effect was checked using a custom model of analysis of covariance. This analysis technique tested differences between the group means when we knew that an extraneous variable affected the dependent variable (18, 19). It provided non-significant output: $\eta^2 = 0.01$ and p-value = 0.21. The other important output displayed from this analysis was the result of Levene's test: p-value<0.001. This result indicated that the group variances were not equal and hence the assumption of homogeneity of variance was violated. This further showed that we failed to reject the null hypothesis in that there was no group by covariate effect on the dependent variable (19). Last, the effect of the group on the covariate was also tested using analysis of variance and gave non-significant result: $\eta^2 = 0.02$ and p-value = 0.09.

Considering the above outlooks, analysis of covariance with the full factorial model was unlocked to evaluate the effect of the group on the dependent variable. This analysis technique is developed to increase the power of the test of the predictor variable, by removing error variance in the dependent variable that is associated with the covariate (18). Statistical significance was determined at p-value<0.05. The group's effect size on the dependent variable was measured using η^2.

Ethical considerations

The study was registered at Clinicaltrials.gov, NCT03639961 on 27 May 2017. Ethical clearance was secured from the corresponding author's institute with a protocol record 090/18-04. Written consent was obtained from each member of the study teams, and data were protected. This work is an extension of our previous work (20).

RESULTS

Ordinary means

Table 2 displays the ordinary mean and standard deviation of institutional delivery performances with 95% CI. The ordinary mean (±SD) difference between the baseline and end line institutional delivery performances were 14.6±7.2 and 1.1±2.2 in the intervention group and the control group, respectively.

Table 2: Ordinary mean and Standard Deviation (SD) institutional delivery performances, Northwest Ethiopia, 2018 (n= 134)

		Ordinary mean and SD institutional delivery performance							
		Baseline			**End line**				
	Measure	Statistic	95% CI		Statistic	95% CI			
			Lower	Upper		Lower	Upper		
Group									
Intervention	Mean	34.2	30.7	37.5	48.8	46.2	51.9		
	SD	12.8	10.6	14.8	12.6	10.4	14.4		
Control	Mean	30.9	28.6	33.2	32.0	29.5	34.6		
	SD	9.5	7.1	11.5	9.1	6.9	11.2		

Estimated means

Table 3 presents the adjusted mean institutional delivery performances that were the original means adjusted for the covariate. The means had changed compared to those found in the ordinary means.

Table 3: Adjusted mean institutional delivery performances, Northwest Ethiopia, 2018 (n= 134)

Group	Mean	Std. Error	95% CI	
			Lower Bound	Upper Bound
Intervention	47.4	0.627	46.2	48.6
Control	33.4	0.627	32.2	34.6

Note: The covariate appearing in the model was evaluated at the following value: baseline institutional delivery performance = 32.6.

Effect of integrated LMG capacity-building program

Table 4 shows that there was an overall statistically significant difference in the mean institutional delivery performance between the groups once their means had been adjusted for the covariate (p-value<0.001).

The output also displayed a 65% ($\eta^2 = 0.65$) effect size of the group on the mean institutional delivery performance. This showed that including the covariate in the analysis increased the group's (intervention's) effect size from 37% (noted in the methods part) to 65%.

Table 4: Outputs of between-subjects effects on adjusted means, Northwest Ethiopia, 2018 (n = 134)

Source	Type III Sum of Squares	Df	Mean Square	Sig.	Partial Eta Squared
Corrected Model	21955.8	2	10977.9	0.000	0.87
Intercept	2169.6	1	2169.6	0.000	0.39
Covariate	12460.4	1	12460.4	0.000	0.79
Group	6435.3	1	6435.3	0.000	0.65
Error	3410.4	131	26.0		
Total	244108.0	134			
Corrected Total	25366.2	133			

Note: R Squared = 0.87, Adjusted R Squared = 0.86

DISCUSSION

The current study findings inform that the integrated LMG capacity-building program intervention causes a statistically significant difference in the mean institutional delivery performance between the groups. The intervention is led by the theory of change to signify the expected relationships between inputs, activities, outputs, and outcomes in a given context (12). This theory has three important attributes: plausibility, doability, and testability that support achievement of the expected outcome of any initiative (13). In the current case, this could be comprehended as a reasonable narrative of the interactions between the various components of the integrated LMG capacity-building program and the plausible pathways through which they have related with the elements of the health facility system to achieve the expected outcome.

The current and few previous studies (9, 10) use the challenge model, in common, to show the logical relationships between facility mission, shared vision, measurable result, current situation, obstacles and root causes, challenge statement, and priority actions. Alongside these relationships, the teams identify key stakeholders to align and mobilize resources and develop an action plan and monitoring and evaluation plan to achieve better results. These pathways can support to track the scientific reliability and empirical scalability of the program.

Differently, the current study examined the integrated LMG capacity-building program that centers the integrated leadership, management, and governance for results model (5). In resource-limited settings including Ethiopia, empowering people and teams using such a model is crucial.

This is comparable with stabilizing a three-legged stool to get a balanced sit on a rough ground (21, 22).

The other unique characteristics of the current study are adjusting the original means for the covariate, and including the control group. These have five-fold benefits (19): (I) it reduces the within-group error variance; (II) it eliminates potential confounders; (III) it provides additional evidence of causality; (IV) it identifies assumption attributes in trends between the groups; and (V) it determines the effect size of the program.

In the current study, the adjusted mean institutional delivery performance (**Table 3**) compared with the ordinary mean institutional delivery performance (**Table 2**) is less in the intervention group, but greater in the control group. This shows that adjusting the mean by removing error variance in the dependent variable that associates with the covariate provides unbiased or uncontaminated mean. Additionally, the adjusted mean institutional delivery performances in both the groups are greater compared with the 2016 Ethiopian demographic health survey institutional delivery performance report (26%). Whereas, compared with the 2019 survey report (48%), the result in the intervention group is comparable, but the result in the control group is less. This finding is supported by a recently published field action report from Ethiopia that reported a 40% institutional delivery performance increase (23). These magnifies the importance of implementing the integrated LMG capacity-building program in improving performances and health outcomes.

The current ordinary mean achievement increased in the intervention group, 14.6%, is slightly greater compared to the average achievement increase reported in the studies done in Kenya, 10% (9) and Mozambique,10% (11). Whereas, it is lower compared with the average achievement increase reported in the study done in Egypt, 41% (10). These increments in general, and the differences, in particular, might be due to that people and teams more empowered to lead, manage, and govern improves the workgroup environment, management system, and responsiveness of the health system (24, 25).

Generally, the current study has important implications for policymaking, planning, implementing and researching in the context of the low and middle-income countries' health systems. Health authorities who lead and manage and govern in these countries and who wish to achieve better results could consider a contextualized integrated LMG capacity-building program(5, 26).

Away from the implications, there were potential limitations in conducting this study. The first drawback was absence of randomization pocedure (15) leading to the second limitation of whether analysis of covariance is used in alike data. Nonetheless, this was applied since there was no preexisted group affecting the covariate (19, 22). The third limitation was use of the statistical principle of regression to the mean in establishing causality (18).

This widespread statistical phenomenon can result in wrong conclusion that an effect is due to the intervention when in reality it is due to chance. The degree of this caution was diminished by implementing the intervention in a real-world setting. The last limitation was the short duration of the intervention in which six months may not be enough to overcome barriers and achieve a significant result.

Conclusions

The integrated LMG capacity-building program is a plausible cause of improved institutional delivery. The program brings a statistically significant difference in the mean institutional delivery between the groups once their means adjusted for the covariate. The program's effect size is 65%. The findings provided from this study might make the program sustainable across time and scalable across similar countries' health systems. To identify the program's true causation, further research could be done considering a randomized control trial.

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Conflict of interest

All the authors declare that they have no both financial and non-financial competing interests.

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