

# A multi-sectoral intervention model to scale up family planning services utilization at the primary health care level: evidence from a priority district, Fayoum governorate, Egypt

Nesreen Mohamed Kamal Elden <sup>(1)</sup>, Walaa Ahmed Khairy <sup>(2)</sup>, Tarek Tawfik Amin <sup>(3)</sup>

(1) Assistant Professor of Public Health and Community Medicine, Faculty of Medicine, Cairo University, Egypt

(2) Lecturer of Public Health and Community Medicine, Faculty of Medicine, Cairo University, Egypt

(3) Professor of Public Health and Community Medicine, Faculty of Medicine, Cairo University, Egypt

**CORRESPONDING AUTHOR:** Walaa Ahmed Khairy, Public Health and Community Medicine Department, Faculty of Medicine, Cairo University, Kasr Al Ainy Street, 11562 Cairo, Egypt - Tel. +20-1223682081 - E-mail: wallaakhairy@yahoo.com

**DOI:** 10.2427/12990

Accepted on May, 25, 2019

## ABSTRACT

**Background:** Egypt is one of the most populous countries in the Middle East and Africa. Evidence from developing countries revealed that increasing family planning use is associated with substantial declines in fertility and population growth. The objective of this study was to assess the impact of implementing a multisectoral intervention model on the family planning utilization at the Primary Health Care (PHC) level in a priority district, Fayoum governorate, Egypt.

**Methods:** A quasi-experimental design was conducted from July 2016 to September 2016. The model targeted 10 PHC units out of 23 at Tamia district, with two types of interventions; health sector and non-health sector related interventions carried out in the intervention units and their catchment areas. The family planning utilization of the intervention units ( $n=10$ ) was compared to the control units ( $n=13$ ). Additionally, the overall family planning utilization at the district level was measured.

**Results:** Following the implementation of the interventions, the overall family planning utilization at the district level showed a significant increase in mean  $\pm$  Standard Error of the Mean (SEM) of new family planning clients ( $44.4 \pm 11.0$  vs.  $63.3 \pm 13.8$ ;  $P=0.006$ ) recording 43% change. The mean  $\pm$  SEM of intrauterine devices dispensed from the intervention units significantly increased by 391% ( $3.5 \pm 1.0$  vs.  $17.2 \pm 3.3$ ;  $P=0.002$ ). Findings from the control units didn't reveal significant increase regarding the dispense of any family planning method.

**Conclusion:** Mobilizing and optimizing resources use, empowering district authorities and strengthening collaboration across sectors were key drivers of the success of this model in scaling up family planning services utilization.

*Key words:* multisectoral, intervention model, family planning, district, Egypt

## INTRODUCTION

Egypt is one of the most populous countries in the Middle East and Africa. According to the United Nations estimates of the annual population growth rates during the period between 2010-2015, Egypt was growing at a rate of 2.2%. Such an extremely rapid population growth has several critical consequences including adverse economic, social and environmental pressures, which is causing concern within the government and constitutes a burden on infrastructure and public services [2,3].

Despite that the Egyptian family planning program had achieved considerable success since 1990, where the total fertility rate (TFR) had declined from 4.4 in 1988 to 3.0 in 2008, yet it unpredictably increased to 3.5 in 2014. In the same context, the family planning use is facing a plateau where the contraceptive prevalence rate (CPR) has not significantly changed, swaying between 59% and 60% since 2005. Additionally, there is a gap in the utilization pattern of family planning services across Egypt. According to the 2014 Egypt demographic and health survey (EDHS), CPR in urban governorates was 62.6% compared to 46.7% in rural upper Egypt governorates [3,5].

During the last six decades, evidence from developing countries revealed that family planning services have significant effects on fertility and population growth, where increases in contraceptive utilization accounted for nearly 75% of fertility declines in these countries [7,8]. Moreover, there is an international consensus that a successful family planning program provides a win-win solution; the wellbeing of individual women and children in addition to the national economic, social and environmental benefits [2].

However, one of the crucial issues related to strengthening program performance in a diversity of settings is that no single formula suits all needs [9]. It is essential to pilot culturally appropriate, sensitive models through; targeting the most disadvantaged populations, empowering district authorities, strengthening collaboration with partners and across sectors, and improving the management of services to be able to scale up the tested model, monitor and adjust program that respond to the specific needs of the community as a result of lessons learned [10,11].

Based on the above-mentioned scenario, this study was conducted to pilot a multisectoral intervention model aiming at scaling up the access to and use of family planning services at the primary health care (PHC) level. This model was carried out by a district management team recruited from all the concerned sectors in a priority district, in Fayoum governorate, Egypt.

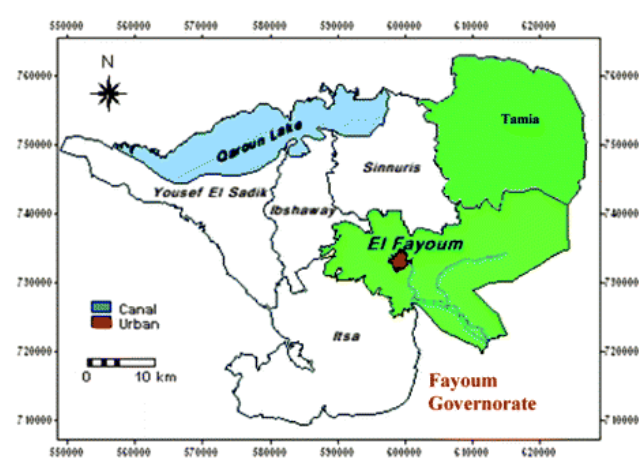
## METHODS

### Study setting

The study was conducted in Tamia district, Fayoum

governorate. Fayoum is populated with 4.2% of Egypt's total population, 9% of total Upper Egypt population, spanning over 6068.8 km<sup>2</sup> [12]. Fayoum is one of the governorates with the highest TFR in Upper Egypt (4.6 child per woman in reproductive age) [5]. As regards the human development index, it occupies the 20<sup>th</sup> rank among the 27 Egyptian governorates [13]. Fayoum governorate comprises six districts, namely; El Fayoum, Sinnuris, Tamia, Yousef El Sadik, Isha, Isha away as shown in figure 1 [14]. The study was carried out in Tamia district, after reviewing the figures of the fertility indicators of the national human development report to select the priority district in Fayoum governorate [15].

**FIGURE 1. Administrative map of Fayoum governorate, Egypt**



### Study design

A quasi-experimental design was used for this study. The study model comprised two types of interventions that were implemented in Tamia district. The first type was health sector related interventions implemented in 10 PHC units out of 23, while the second was non-health sector related interventions carried out in the catchment areas of the same PHC units. The family planning utilization of the targeted PHC units was compared to the control units (n=13) at the district level.

### Study phases

A framework model has been developed to identify and address the challenges at Tamia district. The resulted framework model was composed of the following interrelated phases; pre-intervention, intervention, and post-intervention phase (Figure 2).

Two orientation meetings followed by four preparatory workshops were conducted at the directorate and district level to discuss the current fertility situation of Tamia district

and the possible interventions to overcome this situation, with all the stakeholders including representatives from ministries of health and population (MOHP), education (MOE), culture (MOC), religious affairs (MORA), youth (MOY) and adult education agency. The workshops ended up with a group of challenges that should be addressed at Tamia district namely; the marked shortage in the number of physicians and nurses providing family planning and health education services, lack of capacity building of health care providers affiliated to the PHC units of Tamia. On the other hand, lack of reproductive health knowledge and small family concept among school students and the high prevalence of child marriage and wrong faulty religious beliefs regarding family planning assisted by the high drop outs from primary education. Moreover, poor coordination across sectors to target these drawbacks at the managerial level was reported. Consequently, a district management team (DMT) was recruited to represent all the above mentioned stakeholders. The main task of this team was to identify, design, implement and monitor a package of multisectoral interventions targeting the shortcomings in the health sector as well as the other sectors, through a decentralized three months work plan at the district level as a pilot aiming at improving the family planning services utilization as a short term output and the fertility indicators on the long term.

### Intervention phase

The decentralized district work plan was implemented by the DMT during the period from 1<sup>st</sup> July, 2016 to 30<sup>th</sup> September, 2016. It included customized interventions addressing the above mentioned challenges. The interventions were classified into health sector related interventions and non-health sector related interventions.

Health sector related interventions included the following:

- Capacity building of physicians (n=23), nurses (n=150), health educators (n= 20) and community workers (n= 86), affiliated to the 10 targeted PHC units, on family planning and important reproductive health topics;
- Re-allocation of human resources: Ten physicians from Fayoum health directorate agreed to work part-time in the targeted units during the intervention period. Each physician was assigned 8 visits per month to one of the units. A total of 240 visits were conducted to the intervention units to address the marked shortage in human resources with a frequency of two visits per week during the period of the intervention phase. The average number of physicians in the 10 PHC was 2.3 physician per PHC unit before the intervention (full-time physicians) and increased to 3.3 physician per unit during the intervention

(full-time and part-time physicians).

Non-health sector related interventions targeted mainly community mobilization and advocacy to family planning, small family concept and other critical reproductive health issues such as child marriage, female genital mutilation and reproductive health rights among school children and parents. A series of activities were proposed and conducted, including the following:

- Increased messaging via churches/mosques, following a three days training workshop for the district religious leaders (n=45);
- Mobilizing extracurricular school teachers e.g. Music, arts and sports (n=30) to disseminate reproductive health education messages;
- Art competitions (n=30) between Tamia's schools to advocate for small family concept;
- Eighty-two health education seminars in Tamia's schools by trained health educators to increase awareness against child marriage and reproductive health;
- Twenty educational seminars were delivered in the illiteracy eradication classes within the illiteracy eradication project by trained health educators.

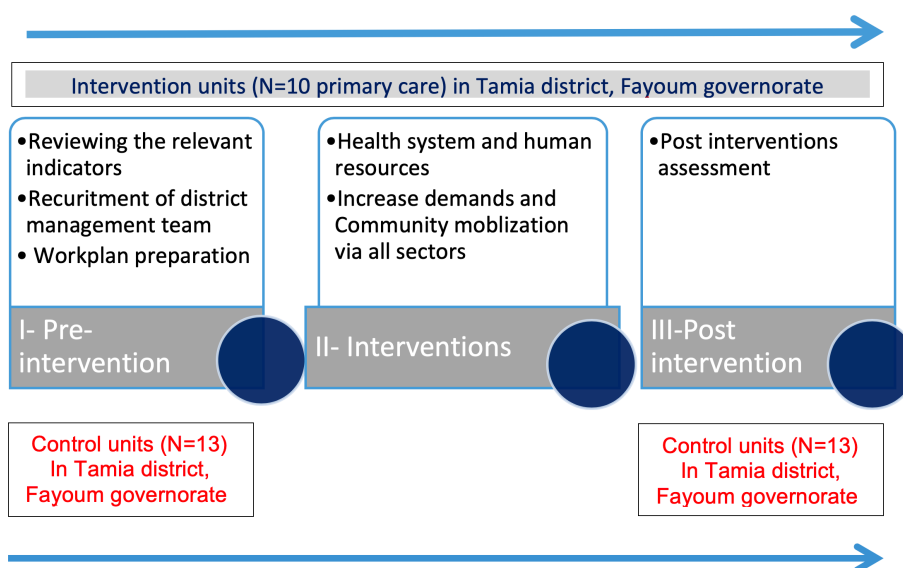
### Post-intervention phase

Service statistics for the utilization of family planning services were obtained from Tamia's information centre affiliated to the MOHP for the 3 months prior to the intervention (pre-intervention) and the three months following the initiation of the interventions (post-intervention) for all the 23 Tamia's PHC units including the intervention and control units.

### Data analysis

Family planning services utilization statistics were analyzed using SPSS software program, version 21 (SPSS Inc. IBM, USA). Quantitative variables were expressed using the median (interquartile range) and mean  $\pm$  standard error of the mean (SEM). SEM is used as a measure of the precision of the mean of the sample. 16 Mann Whitney was used to compare baseline family planning utilization between the intervention and control units. Paired t-test was used for statistical comparison before and after the intervention [17]. The 95% confidence intervals were calculated and P value of  $\leq 0.05$  was considered significant. Percent change was calculated by employing the following formula:  $(y_2 - y_1) / y_1 * 100$ . Cohen d was used to compare the effect size of the intervention model before and after implementation of the interventions. Cohen's d is defined as the difference between two means divided by a standard deviation for the data in case of paired sample t test, i.e. [d= mean difference / standard deviation]. Cohen's d value between 0.2 to 0.5

**FIGURE 2. Conceptual framework for the study model introduced at Tamia district, Fayoum governorate**



is a small effect size, if it is between 0.5 and 0.8 it is a moderate effect size, and an effect size bigger than 0.8 is considered a large effect size [18].

### Ethical considerations

All the necessary ethical and administrative approvals were obtained from the health Directorate of Fayoum governorate affiliated to the MOHP. The study procedures were carried out in accordance with the ethics requirements of the Declaration of Helsinki.

### RESULTS

Assessment of the impact of the study interventions was carried out through comparing the family planning services utilization in terms of volume of clients and methods dispensed before and after implementation of the interventions among the intervention and control PHC units in Tamia district. Moreover, the effect of targeting the ten priority PHC units on the overall family planning services utilization in Tamia district was measured.

Table 1 illustrates the baseline family planning services utilization in the intervention units vs. the control units. There were no statistical significance difference regarding the type of family planning clients and the type of family planning methods used.

#### Family planning services utilization among intervention and control units

Table 2 reveals the mean of new family planning

clients among the intervention and control units had significantly increased following the implementation of the interventions from  $37.5 \pm 8.2$  and  $49.8 \pm 18.6$  to  $70.5 \pm 18.3$  and  $57.8 \pm 59.0$  respectively, confirmed by a large effect size, yet the percent change was higher among the intervention (88%,  $d = 0.8$ ) than the control units (16%,  $d = 0.9$ ). On the other hand, the mean of returning family planning clients had dropped by 23% in the post-intervention phase in the control units ( $d = -0.3$ ).

As regards the utilization of family services utilization in terms of the number of methods dispensed from the PHC units. Table 3 shows that after the intervention, the mean of the dispense of the intrauterine devices (IUDs) and pills had significantly increased from  $3.5 \pm 1.0$  and  $127.9 \pm 29.5$  to  $17.2 \pm 3.3$  and  $144 \pm 33$  respectively. Moreover, the dispense of the IUDs recorded the highest percent change following the intervention (391%,  $d = 1.3$ ). While the control units didn't show any significant change regarding the dispense of any type of methods between the pre and post intervention phases.

#### Overall Family planning services utilization at Tamia district

The results of targeting 10 PHCs units out of 23 on the overall family planning services utilization in Tamia is displayed in table 4. The mean of the total new family planning clients attending Tamia's PHC units had significantly increased from  $44.4 \pm 11.0$  in the pre-intervention phase to  $63.3 \pm 13.8$  in the post-intervention phase, recording 43% change ( $d = 0.6$ ). Regarding the dispense of different family planning methods after targeting the priority PHC units, there was a 63% ( $d = 0.6$ ) and 10%

**TABLE 1. Baseline family planning services utilization in intervention and control PHC units in Tamia**

Family planning utilization	Intervention (N=10) Median [IQR]*	Control (N=13) Median [IQR]*	P value**
New Family Clients	29 [20-59]	23 [14-51]	0.62
Returning Family Clients	175 [127-503]	201 [109.5-312.5]	0.63
Pills	76.5 [64.3-198.3]	98 [48.5-146]	0.42
IUDs***	2.5 [0.75-6.5]	3.0 [0-12]	0.98
Injections (Depovera)	126.5 [78.5-374]	113 [68-23]	0.71
Condoms	0 [0-4]	0 [0-3]	0.87

\* IQR=Interquartile Range

\*\* P value obtained from Mann Whitney test

\*\*\* IUDs=Intrauterine Devices

**TABLE 2. Family planning services utilization in intervention and control PHC units in Tamia according to the type of client (pre-intervention vs. post-intervention)**

Type of client	INTERVENTION UNITS N= 10					CONTROL UNITS N= 13				
	Pre-intervention Mean ± SEM*	Post-intervention Mean ± SEM*	P value (95%CI) **	Percent change	Cohen's d	Pre-intervention Mean ± SEM*	Post-intervention Mean ± SEM*	P value (95%CI) **	Percent change	Cohen's d
<b>New Family Planning clients</b>	37.5 ±8.2	70.5 ±18.3	0.029 (4.3, 61.7)	88%	0.8	49.8 ±18.6	57.8 ±59.0	0.009 (2.4, 13.6)	16%	0.9
<b>Returning Family Planning clients</b>	294.8 ±71.8	312.6 ±74.0	0.165 (-8.9, 44.5)	6%	0.5	255.1 ±20.5	197.2 ±33.5	0.329 (-181.8, 66.1)	-23%	-0.3

\*SEM=standard error of the mean

\*\*P value obtained by Paired t test, CI=confidence intervals of the difference between means

(d=0.6) significant increase regarding the mean of IUDs (9.7±4.6 vs. 15.8±4.7) and the pills (120.9±19.5 vs. 132.8±22.5) respectively. It is also worth noting that the mean dispense of condoms had witnessed a drop in the post-intervention phase by 94% (d= -0.4).

## DISCUSSION

The multisectoral intervention model presented in the current study succeeded to improve the utilization of family planning services at the district level through targeting 10 priority PHCs units (and their catchment area) out of

23, by a package of cross-cutting interventions through engagement of the health sector represented by the MOHP and non health related sectors as the MOY, MOE, MOC, MORA and adult education agency. The findings of this study revealed a significant increase in the mean of new family planning clients at the intervention units by 88% (d= 0.8) and at the district level by 43% (d= 0.6) after implementation of the intervention. Additionally, these findings were associated with a striking significant increase in the dispense of the IUDs at the intervention units by 391% (d= 1.3) and at the district level by 63% (d= 0.6). The most important value added by this study was the adoption of tailored, cost-effective interventions to the needs of a rural

**TABLE 3. Family planning services utilization in intervention and control PHC units in Tamia according to method dispensed (pre-intervention vs. post-intervention)**

TYPE OF METHOD	INTERVENTION UNITS N= 10					CONTROL UNITS N= 13				
	Pre-intervention Mean $\pm$ SEM*	Post-intervention Mean $\pm$ SEM*	P value (95%CI) **	Percent change	Cohen's d	Pre-intervention Mean $\pm$ SEM*	Post-intervention Mean $\pm$ SEM*	P value (95%CI) **	Percent change	Cohen's d
<b>Pills</b>	127.9 $\pm$ 29.5	144 $\pm$ 33.1	0.017 (3.7, 28.5)	13%	0.9	115.5 $\pm$ 26.9	124.2 $\pm$ 31.6	0.187 (-4.9, 22.4)	8%	0.4
<b>IUDs***</b>	3.5 $\pm$ 1.0	17.2 $\pm$ 3.3	0.002 (6.4, 21)	391%	1.3	14.5 $\pm$ 7.9	14.7 $\pm$ 8.0	0.886 (-2.1, 2.4)	1%	0
<b>Injections (Depovera)</b>	190.7 $\pm$ 48.2	203.6 $\pm$ 50	0.228 (-9.7, 35.5)	7%	0.4	170.1 $\pm$ 43.7	174.2 $\pm$ 49.8	0.627 (-13.7, 21.9)	2%	0.1
<b>Condoms</b>	2.2 $\pm$ 1.3	0.00.4	0.126 (-5.2, 0.8)	-100%	-0.5	4.5 $\pm$ 3.1	0.4 $\pm$ 0.11	0.206 (-10.9, 2.6)	-91%	-0.4

\*SEM=standard error of the mean

\*\*P value obtained by Paired t test, CI=confidence

\*\*\*IUDs= Intrauterine devices

**TABLE 4. Overall family planning services utilization in Tamia district (pre-intervention vs. post-intervention) (n= 23 PHC units)**

Family planning utilization	Pre-intervention Mean $\pm$ SEM*	Post-intervention Mean $\pm$ SEM	P value (95%CI) **	Percent change	Cohen's d
New Family Planning clients	44.4 $\pm$ 11.0	63.3 $\pm$ 13.8	0.006 (6.1, 31.6)	43%	0.6
Returning Family Planning clients	272.3 $\pm$ 44.8	247.4 $\pm$ 38.3	0.457 (-93.3, 43.4)	-9%	-0.2
Pills	120.9 $\pm$ 19.5	132.8 $\pm$ 22.5	0.01 (3.1, 20.8)	10%	0.6
IUDs***	9.7 $\pm$ 4.6	15.8 $\pm$ 4.7	0.008 (1.8, 10.3)	63%	0.6
Injections (Depovera)	179 $\pm$ 31.8	187 $\pm$ 34.9	0.219 (-5.1, 20.9)	4%	0.3
Condoms	3.5 $\pm$ 1.8	0.2 $\pm$ 0.2	0.084 (-7.1, 0.5)	-94%	-0.4

\*SEM=standard error of the mean

\*\*P value obtained by Paired t test, CI=confidence intervals of the difference between means

\*\*\*IUDs= Intrauterine devices

disadvantaged district through mobilizing and optimizing the use of resources. This approach goes in accordance with the concept of "leaving no one behind" which was founded by the United Nations General Assembly on September 25<sup>th</sup>, 2015, where equity in access and use of public health services should be a common goal for policy-makers [19,20]. Additionally, improving access to health care delivery remained an essential goal of health reform [21]. Bridging the gap between rural and urban areas in access and use of reproductive health and family planning services is still to be a major challenge [22]. In the same context, health targets for Sustainable Development Goals (SDGs) call for ensuring universal access to reproductive health care services with the integration of reproductive

health into strategies and programs at the national level. Replication of the current tested model in other underserved districts nationwide is expected to accelerate the progress towards the SDGs [19].

One important reason for the success of this model was the engagement of the local stakeholders represented in the DMT and allowing this team to define priorities and create local ownership at the district level, rather than parachuting in and formulating ready made interventions for change. A similar approach was adopted by the Romanian Family Health Initiative aiming at scaling up integrated family planning utilization nation wide between 2001 and 2005. The scale up, was implemented in 36 PHC clinics in 3 districts to increase the family planning

utilization. The main strategy was based on implementing a multisectoral approach through empowering local stakeholders at the decentralized level. The results revealed a significant increase in the modern CPR from 29.5% in 1999 to 38.2% in 2004 [23,24].

Although family planning programs help in slowing population growth and reduction of poverty, they always fail to reach those with the most in need mainly the poor and those living in remote areas [21,25]. For that, new approaches with proven strategies to ensure the availability of family planning services are needed, this intervention was designed to tackle such disparity through mobilizing human resources to cover the marked shortage in physicians and nurses in Tamia PHC units. In the same context, positive findings from the Navrongo service model in Ghana, which tested the effect of relocation of nurses to communities, generated official interest in replicating the experiment in all districts of Ghana [21,26].

Despite that many countries managed to overcome the challenges associated with the access to family planning services through successful community-based distribution or outreach programs [10]. One unique feature of the current study is providing evidence through comparing outcomes in the intervention vs. the control units. A systematic review conducted by Mwaikambo et al in 2011 to evaluate family planning interventions, pointed out that only few studies has provided cause effect of family planning interventions [10]. One of the most prominent controlled experimental studies, is the Matlab project that was carried out in a rural district in Bangladesh. Outreach family planning programmes were implemented in 71 villages out of 141 through trained community health workers. Within 2 years of the interventions, the percentage of women using contraception has increased from less than 5% to 32% in the intervention arm compared to a slight change in the control arm. The success of the tested interventions guided the Bangladesh government to adopt the Matlab model as the national strategy for family planning [8].

In this model, significant positive changes in the utilization of family planning methods after the intervention were associated with the dispense of the IUDs, followed by the pills. These findings matched the results of the EDHS (2014), where the most widely used contraceptive method was the IUD (30%), followed by the pill (16%) [5]. The current study revealed a drop in the use of condom as a contraceptive method in the post intervention phase. Although the use of non-barrier contraceptive methods provides good protection against pregnancy, they may increase the risk of sexually transmitted diseases (STDs). For that, fertile individuals with high risk for STDs who want to limit pregnancies should be counseled to use both a barrier and non-barrier contraceptive methods [27,28].

The challenge remains to identify implementation strategies that support health system through evidence-based cost-effective solutions. Effective change requires committed individuals who are interested in system change.

Change agent strategy requires balancing between external assistance and internal ownership [21]. In the current study, enthusiastic coordinators from the different sectors in the district with the assistance of experts implemented the proposed intervention within a district planning context.

### Strengths and limitations

The current study has prominent strengths. It measures the effectiveness of a tailored public health intervention model to improve the access to health care services in poorly rural served areas. This model was designed to foster the replication of similar demonstration projects in multiple areas around the country. The small-scale intervention enabled to focus on a manageable operational change agent and clarify what is required to undertake the change. This geographically limited trial had successfully mobilized the community to improve the utilization of family planning services.

Adding to the complexity, interventions that focus on improving access to health care will reduce socioeconomic inequalities in health status and achieve a large gain in the overall health status. Health interventions in priority areas aim to reduce inequalities among a disadvantaged group of people and to maximize the population health [29,30]. Hence, this study targeted people in the catchment areas of ten rural PHC and the effect on the overall district indicators were studied before and after the intervention.

Despite the success of this model in scaling up family planning services utilization, there were some limitations. The model was tailored to the district's situation and was context-specific. Yet, the methodology and the lessons learned could guide similar interventions in rural settings. Also, the shortage of resources is a great challenge to the sustainability of the intervention's effects.

High workloads and understaffing are among the most common reported challenges in the health care settings. Those challenges may cause burnouts of the staff and high turnover [31]. In this study, a physician's reallocation intervention was implemented to address such challenges. The effect of this intervention on family planning utilization was tested but its effect on health care providers' teamwork and satisfaction was not studied. Assessment of the effect of staff strategies on work satisfaction should be considered in future researches.

The economic appraisal may be applied to the evaluation of the effectiveness of public health interventions. Unfortunately, the socio economic evaluation of this intervention was not conducted. The economic evaluation may face some challenges in the public health domain: the economic assessment traditionally synthesizes costs and final outcomes only. Although the behavior change is essential to determine the success of a public health intervention, this intermediate process is often difficult to be measured and assessed. In addition, public health

interventions use many approaches and may take long time to realize its final outcome [32]. Thus, it will be difficult to specify the adequate time for assessment and to identify the element that causes the change.

## CONCLUSION

Guided by strategic directions and tested by studies, the evidence could be put into action. Interventions that promote access to services through mobilization of resources are feasible and effective. Collaboration with existing local authorities from different sectors at service delivery is essential to implement change strategies. The model is a road map that can guide the scaling up all over Egypt and in similar settings in low resource countries.

## Acknowledgments

The authors would like to express gratitude to all the members of the district management team representing ministries of health and population, education, culture, religious affairs, youth and adult education agency for their valuable contribution in this study.

## Contributions

NMK, WAK, participated in the study design, field work, data analysis, and manuscript writing. TTA, supported data analysis, and manuscript reviewing.

## Conflict of interests

The authors declare no potential conflict of interests.

## Funding

The work was supported by a Ford Foundation grant, no. 0150-0916, under the umbrella of the national project entitled "strengthening the reproductive health in Egypt, phase II".

## Conference presentation

Part of this paper was presented at the 6th World Nursing and Healthcare Conference, 2016 Aug. 15-17, London, United Kingdom.

## References

1. United Nations. World Population Prospects: The 2015

Revision. Population Division, Dept. of Economic and Social Affairs, United Nations; New York, NY: 2015. [https://esa.un.org/unpd/wpp/publications/files/wpp2015\\_databooklet.pdf](https://esa.un.org/unpd/wpp/publications/files/wpp2015_databooklet.pdf)

2. Ezeh AC, Bongaarts J, Mberu B. Global population trends and policy options. *The Lancet* 2012;380(9837):142-8. <https://www.ncbi.nlm.nih.gov/pubmed/22784532>
3. Basera, United Nations Population Fund, National Population Council: Population situation analysis: 2016 Egypt. Basera, Egypt; Cairo: 2017. <https://egypt.unfpa.org/en/publications/population-situation-analysis-egypt-2016>
4. Ahmed SM, Rawal IB, Chowdhury SA, et al. Cross-country analysis of strategies for achieving progress towards global goals for women's and children's health. *Bulletin of the World Health Organization* 2016;94(5):351. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4850533/>
5. Ministry of Health and Population of Egypt, El-Zanaty and Associates, ICF International. Egypt Demographic and Health Survey 2014. Cairo; Egypt and Rockville; Maryland; USA: 2015. <https://dhsprogram.com/pubs/pdf/FR302/FR302.pdf>
6. Khalifa M, Abdelaziz W, Sakr E. Changes in contraceptive use dynamics in Egypt: Analysis of the 2008 and 2014 Demographic and Health Surveys. DHS Working Papers, No. 132. Rockville; Maryland; USA:2017. <https://dhsprogram.com/pubs/pdf/WP132/WP132.pdf>
7. Cleland J, Conde-Agudelo A, Peterson H, et al. Contraception and health. *The Lancet* 2012;380(9837):149-56. <https://www.ncbi.nlm.nih.gov/pubmed/22784533>
8. Canning D, Schultz TP. The economic consequences of reproductive health and family planning. *The Lancet* 2012;380(9837):165-71. <https://www.ncbi.nlm.nih.gov/pubmed/22784535>
9. Bongaarts J, Mauldin WP, Phillips JF. The demographic impact of family planning programs. *Studies in family planning* 1990;21(6):299-310. <https://www.ncbi.nlm.nih.gov/pubmed/2075620>
10. Mwaikambo L, Speizer IS, Schurmann A, et al. What works in family planning interventions: a systematic review. *Studies in family planning*. 2011 Jun;42(2):67-82. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3761067/>
11. United Nations Children's Fund. Pursuing Equity in Practice: A compendium of country case studies on the application of the Monitoring Results for Equity System (MoRES). Programme Division, United Nations Children's Fund; New York, NY: 2015. [https://www.unicef.org/egypt/eg\\_UNICEF-MoRES-case-studies-2014-including-Egypt.pdf](https://www.unicef.org/egypt/eg_UNICEF-MoRES-case-studies-2014-including-Egypt.pdf)
12. Central Agency for Public Mobilization and Statistics: Egypt in Figures 2015. Accessed on 20th January 2017. <http://www.msrinternet.capmas.gov.eg/pdf/EgyptinFigures2015/EgyptinFigures>
13. United Nations Development Programme, and Institute of National Planning: Human Development Report 2010: Youth in Egypt, Building our Future. Institute of National Planning; Cairo; Egypt: 2010. [http://hdr.undp.org/sites/default/files/reports/243/egypt\\_2010\\_en.pdf](http://hdr.undp.org/sites/default/files/reports/243/egypt_2010_en.pdf)
14. Abd-Elgawad M, Shendi MM, Sofi DM, et al. Geographical distribution of soil salinity, alkalinity, and calcicity within Fayoum and Tamia districts, Fayoum Governorate, Egypt. In *Developments in Soil Salinity Assessment and Reclamation 2013* (pp. 219-236). Springer, Dordrecht. <https://link.springer.com/chapter/10.1007>



- %2F978-94-007-5684-7\_14
15. Institute of National Planning, Ministry of Local Development: National human development report for governorates (Alexandria, Kalyobia, Menoufia, ,Kafr El Sheikh, El Sharkia, Fayoum and Assuit). Institute of National Planning; Cairo; Egypt: 2015.
  16. Altman DG, Bland JM. Standard deviations and standard errors. *Bmj*. 2005 Oct 13;331(7521):903. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1255808/>
  17. Mochache V, Irungu E, El-Busaidy H, Temmerman M, Gichangi P. "Our voices matter": a before-after assessment of the effect of a community-participatory intervention to promote uptake of maternal and child health services in Kwale, Kenya. *BMC health services research*. 2018 Dec;18(1):938. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6280535/>
  18. Cohen J. *Statistical power analysis for the behavioral sciences*. 2nd. Lawrence Earlbaum Associates, Hillsdale, NJ: 1988.
  19. United Nations. *Transforming our world: The 2030 agenda for sustainable development*. Resolution adopted by the General Assembly. 2015 Sep 25. <https://sustainabledevelopment.un.org/post2015/transformingourworld/publication>
  20. United Nations. *Social justice in an open world: The role of the United Nations*. United. Division for Social Policy and Development, Department of Economic and Social Affairs, United Nations; New York, NY: 2006. <https://www.un.org/esa/socdev/documents/ifsd/SocialJustice.pdf>
  21. Nyongator FK, Awoonor-Williams JK, Phillips JF, et al. The Ghana community-based health planning and services initiative for scaling up service delivery innovation. *Health policy and planning* 2005;20(1):25-34. <https://www.ncbi.nlm.nih.gov/pubmed/15689427>
  22. Roudi-Fahimi F, Monem AA, Ashford L, El-Adawy M. Women's need for family planning in Arab countries. *United Nations Population Fund Popul Ref Bur* 2012:1-8. [http://www.who.int/evidence/resources/policy\\_briefs/UNFPAPBunmentneed2012.pdf](http://www.who.int/evidence/resources/policy_briefs/UNFPAPBunmentneed2012.pdf)
  23. Gasco M, Wright C, Ptruleasa M, Hedgecock D. Romania: scaling up integrated family planning services: a case study. Arlington, VA: DELIVER Project for the US Agency for International Development; 2006. [https://www.jsi.com/JSIInternet/Inc/Common/\\_download\\_pub.cfm?id=10342&lid=3](https://www.jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=10342&lid=3)
  24. Benson J, Andersen K, Samandari G. Reductions in abortion-related mortality following policy reform: evidence from Romania, South Africa and Bangladesh. *Reproductive health* 2011;8(1):39. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3287245/>
  25. Roudi-Fahimi F. *Women's reproductive health in the Middle East and North Africa*. Washington, DC: Population Reference Bureau; 2003. [https://www.prb.org/wp-content/uploads/2003/02/WomensReproHealth\\_Eng.pdf](https://www.prb.org/wp-content/uploads/2003/02/WomensReproHealth_Eng.pdf)
  26. Adjei S, Phillips JF, Jones TC. The utilization of evidence from experimental research to guide sector-wide health care reform in Ghana. In presentation at the Annual Conference of the American Public Health Association, Philadelphia, Pennsylvania 2002 Nov 10. [https://apha.confex.com/apha/130am/techprogram/paper\\_43582.htm](https://apha.confex.com/apha/130am/techprogram/paper_43582.htm)
  27. Baeten JM, Nyanje PM, Richardson BA, Lavreys L, Chohan B, Martin Jr HL, Mandaliya K, Ndinya-Achola JO, Bwayo JJ, Kreiss JK. Hormonal contraception and risk of sexually transmitted disease acquisition: results from a prospective study. *American journal of obstetrics and gynecology*. 2001 Aug 1;185(2):380-5. <https://www.ncbi.nlm.nih.gov/pubmed/11518896>
  28. Mohlajee AP, Curtis KM, Peterson HB. Does insertion and use of an intrauterine device increase the risk of pelvic inflammatory disease among women with sexually transmitted infection? A systematic review. *Contraception*. 2006 Feb 1;73(2):145-53. <https://pdfs.semanticscholar.org/416e/df204b062bbc3c1250da09b15cd4aad07399.pdf>
  29. Woodward A, Kawachi I. Why reduce health inequalities?. *Journal of Epidemiology & Community Health*. 2000 Dec 1;54(12):923-9. <https://jech.bmj.com/content/54/12/923>
  30. Baltussen R, Niessen L. Priority setting of health interventions: the need for multi-criteria decision analysis. *Cost effectiveness and resource allocation*. 2006 Dec;4(1):14. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1560167/>
  31. Hämmig O. Explaining burnout and the intention to leave the profession among health professionals—a cross-sectional study in a hospital setting in Switzerland. *BMC health services research*. 2018 Dec;18(1):785. <https://www.ncbi.nlm.nih.gov/pubmed/30340485>
  32. Kelly MP, McDaid D, Ludbrook A, Powell J. *Economic appraisal of public health interventions*. London: Health Development Agency. 2005. <https://pdfs.semanticscholar.org/1935/79db82e41ea8bed64108de1259756d54023e.pdf>

