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Correspondence to

James F. Phillips

Heilbrunn Department of Population and Family Health, Mailman School of Public Health, Columbia University, 60 Haven Avenue, New York, NY 10032, USA.
E-mail: james.phillips@columbia.edu

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ORCID iDs

Patrick O. Asuming ,
<https://orcid.org/0000-0002-5010-3484>
Ayaga A. Bawah ,
<https://orcid.org/0000-0003-4864-4182>
Edmund Wedam Kanmiki ,
<https://orcid.org/0000-0001-7175-5222>
James F. Phillips ,
<https://orcid.org/0000-0002-6720-7204>

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Does expanding community-based primary health care coverage also address unmet need for family planning and improve program impact? Findings from a plausibility trial in northern Ghana

Patrick O. Asuming ¹, Ayaga A. Bawah ², Edmund Wedam Kanmiki ³, James F. Phillips ⁴

¹Department of Finance, University of Ghana Business School, Legon, Accra, Ghana

²Regional Institute for Population Studies, University of Ghana, Legon, Accra, Ghana

³Institute for Social Science Research, University of Queensland, Indooroopilly, QLD, Australia

⁴Heilbrunn Department of Population and Family Health, Mailman School of Public Health, Columbia University, New York, NY, USA

ABSTRACT

Background: The core strategy for achieving universal health coverage (UHC) in Ghana concerns the goal of expanding access to primary health services to all rural households through an initiative known as Community-based Health Planning and Services (CHPS). To test means of accelerating CHPS implementation, a 5-year primary health system strengthening trial was launched in 2010 that was known as the Ghana Essential Health Interventions Program (GEHIP). Fielded in 4 rural northern districts with 7 comparison districts, GEHIP achieved total CHPS coverage in 4 years, thereby expanding access to community nursing care for the treatment of childhood illness, the provision of immunizations, and promotion and delivery of family planning services.

Methods: The impact of UHC achievement on contraceptive use and unmet need is assessed with a 2 stage random sample of reproductive-aged women residing in treatment and comparison districts at the GEHIP baseline and end line. A difference-in-differences (DIDs) regression model is employed to estimate the average GEHIP treatment effect on the use of modern contraceptives and unmet need for contraception.

Results: After controlling for maternal age, children ever born, education, religion, ethnicity, and occupation, regression results show that the GEHIP program had a significant DID effect on modern contraceptive use (odds ratio [OR], 1.795; 95% confidence interval, 1.320–2.439) but no effect on unmet need for contraception.

Conclusion: Expanding access to community-based primary health care improved contraceptive use, but was insufficient for reducing unmet need. Possible implications for supplementing community-based primary health care with family planning focused social mobilization are reviewed.

Keywords: Contraceptive use; Family planning; Unmet need; Community-based health care; Universal health coverage; Health systems strengthening; Northern Ghana

Author Contributions

Conceptualization: Asuming PO, Bawah AA, Phillips JF; Data curation: Kanmiki EW, Asuming PO; Formal analysis: Asuming PO; Kanmiki EW, Bawah AA; Investigation: Bawah AA, Asuming PO, Kanmiki EW; Methodology: Asuming PO, Bawah AA, Phillips JF; Validation: Kanmiki EW; Writing - original draft: Asuming PO; Writing - review & editing: Phillips JF.

INTRODUCTION

In recent years, Ghana has been at the forefront of health systems development in Africa, due in part to the successful development of community-based primary health care. Policies that can be traced to the Alma Ata accord,¹ refined by formative research in Navrongo over the 1994–1996 period^{2,3} and tested by a plausibility trial from 1996 to 2003 have demonstrated that community-based primary health care can save childhood lives and reduce fertility.^{4–6} In response to this evidence, the Ghana Health Service adopted the Community-based Health Planning and Services (CHPS) Initiative in 1999 as a policy aiming to scale-up lessons learned.^{7–9} Following national CHPS implementation in 2000, long term observation trials and tests of replicability show that posting nurses to community locations and mobilizing rural villages to develop systems for stationing primary healthcare accelerated the achievement of Millennium Development Goal 4 (reduction in child mortality) in localities where CHPS service system was fully functional.⁶

Apart from initiatives in Mozambique,¹⁰ Tanzania,¹¹ and Rwanda,^{12,13} longitudinal experimental studies of health systems development are rarely pursued in Africa.^{14–16} Studies of the impact of health systems strengthening on family planning preferences and use are rarer still. This paper examines the widely accepted, but seldom tested, assumption that implementing health system strengthening programs is tantamount to achieving universal access to family planning.^{17–19} Successful program implementation is typically associated with increased contraceptive use and diminished unmet need.^{20–22} In general, increases in contraceptive use are typically associated with concomitant declines in unmet need for contraception.²³ However, these relationships have been less consistently demonstrated in Africa, and where unmet need trends are less likely to be related to health program effort than has been the case in other regions. We examine the family planning and unmet need impact of a project known as the Ghana Essential Health Interventions Program (GEHIP), a highly successful plausibility trial of health system strengthening for expanding community-based primary health care coverage. GEHIP had a comprehensive regimen of family planning services embedded into its primary health care operational design. The project accelerated CHPS coverage from 20% of households in treatment districts at the baseline to 100% in 4 years, a level of progress that was double the coverage achieved in comparison districts. Lessons emerging from this success have moved Ghana closer to achieving its universal health coverage (UHC) goals.²⁴ GEHIP had concomitant child survival effects at a low incremental cost.^{25,26} This paper tests the hypothesis that expanded access to community-based health care by pursuing UHC is associated with a corresponding impact on family planning and preferences to space or limit childbearing.

The primary care system in Ghana is organized as a 4-leveled hierarchy of care. Tertiary referral services are provided at regional and teaching hospitals. Most districts have hospitals with surgical care capabilities. Sub-district clinics and health centers vary in staffing and level of service provision but, in general, provide basic preventive and curative health services. At the lowest level, community-based care is provided by the CHPS initiative. A program that is implemented in clusters of communities termed “zones” where populations ranging from 3 to 5 thousand receive primary health care services from resident paramedical workers termed “Community Health Officers (CHO).” Each CHO is trained to provide basic curative and preventive health services, that includes family planning counselling and care for oral, injectable and barrier methods, as well as referral services for maternal and child health clinical care at sub-district clinics where long acting contraception is available.²⁷

The historical antecedent to CHPS was the Navrongo Community Health and Family Planning Project which achieved extraordinary success in reducing childhood mortality in one district by mobilizing rural communities to develop local health systems and stationing nurses in the community.^{4,6} When levels of child mortality are compared with 1990 estimates, levels recorded in Navrongo treatment communities were reduced by over half in only 3 years and by two thirds within 7 years.⁴ Navrongo results for family planning were also indicative of success, but operational requirements of family planning impact differed somewhat from the corresponding strategic requirements for childhood survival success.⁵ Wherever nurses were deployed, child survival impact was pronounced. But nurse deployment had no impact on family planning and fertility unless CHO activities were combined with community mobilization and male outreach for family planning. Where this combined approach was implemented, Navrongo experiment reduced fertility by 15%, corresponding to a one birth reduction in the total fertility rate relative to communities that lacked exposure to this approach.⁶ Achieving geographic access to care was essential to achieving family planning impact but supplementing this approach with family planning oriented social mobilization was an essential prerequisite for women to progress with implementing their perceived need for family planning care.²⁸

Access to primary care was not immediately achieved by the 1999 CHPS policy. A variety of service delivery, manpower, communication, logistics, resource management, and leadership bottlenecks constrained the pace of CHPS sponsored scale-up of accessible community services in its first decade of operation.²⁹ In response to monitoring evidence showing this slow pace of implementation, the Ministry of Health launched a qualitative appraisal of the CHPS program in 2009 which aimed to clarify operational factors that constrain CHPS scale-up. The review compared leadership responses to questions about CHPS implementation in regions and districts where CHPS was progressing well with corresponding responses in regions and districts where the pace of implementation was unacceptably slow.³⁰ Recommendations of this review highlighted a set of systems development needs that informed the operational design of GEHIP.³¹ Specific health system strengthening recommendations provided operational details that exemplified ways to implement World Health Organization (WHO) recommended “building blocks” for strengthening health system functioning.³² GEHIP was designed to test the proposition that implementing the WHO framework would address problems highlighted in the Ministry of Health review, thereby strengthening health system functioning by accelerating CHPS implementation and improving survival.

The targeted interventions undertaken by GEHIP to strengthen the health systems included: 1) construction of low cost interim CHPS community facilities with volunteer labor as a means of accelerating the production of health posts where CHPS primary health care services could be provided, 2) expanding community-engagement for organizing emergency referral systems and acute care at hospitals, 3) training volunteers in providing support for CHO administered “integrated management of childhood illness” services, 4) simplifying and improving information systems for frontline workers, 5) assuring uninterrupted logistics and supplies, 6) improving procedures for prioritizing financial planning according to needs defined by the burden of disease, and 7) redirecting leadership training to community engagement and district resource mobilization.

As such, GEHIP was a UHC development initiative that was not explicitly focused on family planning. Yet, its focus on improving CHPS access was tantamount to improving access

to the full range of family planning care that CHO are trained and equipped to provide. This involved provision of information and care for oral, barrier, and injectable methods as well as referral services for clinical methods and backstopping needs. Because family planning is a key component of CHPS services, the set of interventions implemented by GEHIP are posited to improve access to family planning care and use of methods. Moreover, GEHIP interventions could improve the credibility of family practice by developing popular awareness of its impact on childhood survival.³³ The potential impact of improved access to CHPS services on unmet need is unknown, but baseline research produced evidence that only 13% of currently married women were using modern contraception while nearly half of the non-users indicated perceived need. Desired to space additional childbearing was particularly prominent, representing 31.7% of all non-contracepting respondents.³⁴ On one hand, GEHIP interventions could increase demand for family planning in ways that exceed system capacity to provide services. Or, enhanced access to CHPS care may facilitate interest in adoption without offsetting social barriers to contraceptive practice, an effect that would increase unmet need. Alternatively, GEHIP could improve access in a manner that potential users seek, directly supporting the implementation of their preferences by offsetting supply-side constraints to use of contraceptives, thereby reducing unmet need.

GEHIP interventions were instituted in 4 treatment districts in Ghana's Upper East Region (UER) of northern Ghana: Bongo, Builsa North and South and Garu Tempane. Seven contiguous districts—Bawku Municipal and Bawku West, Bolgatanga Municipal, Binduri, Nabdam, Pusiga and Talensi—served as GEHIP comparison areas (Fig. 1). Two districts—Kassena-Nankana Municipal and Kassena-Nankana West districts—were excluded because they had been sites for the implementation of potentially confounding health interventions of completed Naval Health Research Center research protocols.³⁵

METHODS

Data resources

The data used in this study emanated from 2 rounds of cross-sectional surveys of households in the UER of Ghana collected solely for the evaluation of the GEHIP project. The first round of the survey was conducted prior to implementation of GEHIP interventions in 2011 and the terminal survey was conducted in 2015. Both rounds followed identical 2-stage sampling procedures. In the first stage, 66 predominantly rural enumeration areas (EAs) were sampled from 11 UER districts using probabilities proportional to population size of the districts. A complete listing of all households in the sampled EAs was conducted to serve as sampling frame for second stage sampling. In the second stage, random household selection proceeded within each cluster proportional to EA size until the target sample total of 6,000 women of reproductive age were selected. A similar procedure was adopted at the end line with a complete re-listing of households, using the baseline 66 clusters. All women of reproductive age (15–49 years) in the sampled households were interviewed in both survey rounds. A total of 5,564 women of reproductive age were interviewed at baseline while 5,914 were interviewed at end line.

The questionnaire employed was adapted from the 2008 Ghana Demographic and Health Surveys (GDHS) instrument.³⁶ Accordingly, information was collected on women's educational attainment, reproductive and pregnancy histories, fertility preferences, use of

Fig. 1. GEHIP intervention and comparison districts.
GEHIP = Ghana Essential Health Interventions Program.

antenatal care services, place of delivery and post-natal care services. In keeping with GDHS procedures, contraceptive use was recorded by method as well as reproductive preference information required for calculating unmet need for contraception. In addition, the questionnaire collected information on household characteristics and asset ownership for determining wealth status.

Our definition of unmet need follows that of the DHS recommended procedure developed by Westoff and Bankole.^{37,38} Accordingly, 4 categories of women are classified as having an unmet need: 1) Women who are currently married and fecund and report that they want to postpone their next birth for at least 2 years, or 2) women who do not want any more children but are currently not using a modern contraceptive method, or 3) currently pregnant women who report that their pregnancy was not wanted or was wanted later, or 4) amenorrheic women who are currently not using modern contraceptive method but report that their last birth was mistimed or unwanted. For this analysis we restrict our sample to only currently married women aged 15 to 49. Thus 3,143 women representing 56.6% of sampled surveyed at baseline and 3,308 representing 55.6% of surveyed women at end line were included in the analysis in this study.

Statistical procedures

This paper aims to test the hypothesis that the GEHIP set of interventions leads to increased use of modern contraceptives and reduced unmet need for family planning. The GEHIP project was designed to accommodate systems analyses that bring into account the multi-level aspects of the administrative hierarchy of the program, the research and the health and survival implications of household exposure to services at different levels of the health delivery system. Since GEHIP was designed as a plausibility trial and was not a randomized controlled trial (RCT), districts were not randomly assigned to the intervention or comparison cells. As such, we do not expect a balance of baseline and end line characteristics between women in the intervention and comparison districts as would have been the case in an RCT. Methods adjust for this problem by including potential confounders in regression models.

To identify the effect of the GEHIP project on contraceptive use and unmet need for contraception, we estimate the Heckman^{39,40} difference-in-differences (DIDs) model of average treatment effects (ATEs) given by:

$$\text{Outcome}_{idt} = \alpha + \gamma \text{GEHIP}_{id} + \theta \text{end}_t + \beta(\text{GEHIP}_{id} * \text{end}_{it}) + \mathbf{X}'_{idt} \rho + \varepsilon_{idt} \quad (1)$$

where i denotes woman, d denotes district and t denotes time (survey round). GEHIP is an indicator that a district where a given sample household is located is a GEHIP intervention district, end is an indicator for end line observation, with the DID estimator identified by the coefficient on the interaction of these 2 terms, β . The vector $\mathbf{X}$ denotes characteristics of women, including age and its square, education, children ever born, religion, ethnicity, indicator for being in a polygamous marriage, occupation and enrollment status in the National Health Insurance Scheme (NHIS), Ghana's social health insurance program. The vector $\mathbf{X}$ also specifies household level variables such as residence type (rural or urban) and household wealth index. The idiosyncratic error term is ε . All analyses were conducted with the STATA version 14.12 (StataCorp, College Station, TX, USA).⁴¹

The 2 main outcomes variables analyzed in this paper are 1) indicator for using modern contraceptive, and 2) indicator for having unmet need for contraception. Because of the dichotomous nature of both outcome variables, model 1 estimations are standard logistic regression models with effects expressed as odds ratios (ORs). All regressions employed procedures for adjusting standard errors for EA cluster level effects to account for possible correlation in outcome variables within common localities.

Ethical approvals

Ethical approval for the GEHIP project was granted by the Navrongo Health Research Centre ethical review board under IRB number FWA00000250 and the ethical review board of Columbia University Medical Center, Mailman School of Public Health under IRB number AAAD7478.

RESULTS

Descriptive statistics

Table 1 presents the descriptive statistics of the study participants. This analysis is restricted to currently married women. Our baseline sample included 3,143 women, made of 1,535 women in the intervention districts and 1,608 from the comparison districts. The end line

sample includes 3,308 women, including 1,700 from the intervention districts and 1,608 from the comparison districts. **Table 1** shows that women in the sample are quite young. At both baseline and end line, about half of the women in our analytical sample were less than 30 years of age. Educational attainment in this largely rural setting is quite low. At baseline, 72% of women in the intervention districts and 80% of women in the comparison districts had no formal education. Only 4% of women in the intervention districts and 2% of women in the comparison districts had secondary education or higher. The end line sample shows only a slight improvement in the level of educational attainment, with 69% of women in the intervention districts and 73% of women in comparison districts having no formal education.

At baseline, the average number of children ever born to the women was slightly above 4 per women and this was slightly higher in the intervention districts (4.14) compared with the comparison (3.98) districts. The intervention districts saw a slightly higher reduction in children ever born between the baseline and the end line.

Table 1. Background characteristics of study respondents

Characteristics	Baseline (2011)			End line (2015)		
	Intervention	Comparison	P-value	Intervention	Comparison	P-value
No. of women	1,535	1,608		1,700	1,608	
Woman's age in years			0.08			0.06
15–19	4.4	3.2		4.5	5.3	
20–24	14.3	16.6		15.1	18.1	
25–29	18.3	18.4		18.4	19.9	
30–34	18.3	19.6		17.5	17.0	
35–39	18.4	18.3		17.9	16.4	
40–44	17.1	14.1		15.8	13.1	
45–49	9.1	9.8		10.8	10.1	
Woman's education			0.00			0.10
No formal education	72.1	80.3		68.9	73.1	
Primary/middle/JHS	23.9	17.7		24.2	22.0	
Secondary plus	3.9	2.1		5.9	4.0	
Children ever born	4.1 (2.3)	3.9 (2.2)	0.04	3.7 (2.2)	3.8 (2.2)	0.07
Woman in polygamous marriage			0.86			0.02
Yes	38.1	37.8		36.5	32.5	
No	61.9	62.2		63.5	67.5	
Woman's religion			0.00			0.04
Christian	55.1	44.1		56.2	54.6	
Traditional	17.1	16.6		12.4	11.2	
Islam	24.2	34.8		29.9	31.3	
No religion	3.7	4.5		1.6	2.9	
Woman's ethnicity			0.00			0.00
Buli	30.8	0.1		31.4	0.0	
Frafra	21.8	39.8		19.9	49.6	
Kusasi	22.5	41.9		21.0	32.2	
Others	24.9	18.2		27.7	18.1	
Woman's occupation			0.00			0.00
Farming	50.9	44.0		49.4	33.6	
Trading	25.6	23.6		19.4	23.3	
Hairdressing/dressmaking	8.7	10.9	0.00	11.9	13.3	0.00
Student	0.8	0.9		1.7	1.4	
Others/no occupation	14.0	20.5		17.6	18.4	
Woman currently enrolled in the NHIS			0.24			0.01
Yes	37.5	39.6		44.7	39.0	
No	62.5	60.4		55.3	61.0	

Values are presented as percent distributions or mean (standard deviation). P-values are from χ^2 tests.

NHIS = National Health Insurance Scheme; JHS = junior high school.

About 38% of the women were in polygamous marriages at baseline and this was similar between the intervention and comparisons. There was a slight reduction in the fraction of women in polygamous union at the end line and this was more pronounced in the comparison area. The commonest religion among the women in the sample is Christianity with more than half of the women identifying with this religion. The other religions practiced by women in the sample are Islam and traditional African religion.

The 3 most common ethnic groups were Buli, Frafra, and Kusasi which together account for 78% of the sample. The most common occupation among women is farming, followed by trading. Consistent with national enrollment rates, enrollment in the NHIS was about 38% at the baseline and this was similar between the intervention and comparison districts. However, at the end line, enrollment in the NHIS was slightly higher for the intervention districts (45% compared with 39%).

Table 1 also presents tests of differences in the characteristics of women between the intervention and comparison districts at the baseline. The table shows that the age marital composition of treatment and comparison districts the baseline were similar, but educational attainment, children ever born, religion, ethnicity and occupation compositions differed significantly. Since these latter variables are predictors of contraceptive use, it is important to control for these in the estimation.

The effect of GEHIP on contraceptive use

Figs. 2 and 3 present graphical illustrations of the DID estimation of the effect of the GEHIP interventions on contraceptive use and unmet need for contraception. Both figures illustrate crude contraceptive prevalence rate without controlling for other factors that affect contraceptive use and unmet need. **Fig. 2** and **Table 2** shows that at baseline contraceptive prevalence was slightly higher in the comparison districts (19% compared with 16.4%). However, at the end line this relationship reversed (26.9% compared with 20.7%). As a rate of increase, contraceptive use increased by 64% in the intervention areas compared with 9% in comparison areas. The corresponding crude DID estimate is 55%, a statistically significant ATE (OR, 1.71; 95% confidence interval [CI], 1.26–2.31) showing that GEHIP interventions had a statistically significant positive effect on the use of modern contraceptives.

Fig. 2. Effect of the GEHIP project on contraceptive use.
GEHIP = Ghana Essential Health Interventions Program; CI = confidence interval.

Fig. 3. Effects of the GEHIP project on unmet need for contraception.
GEHIP = Ghana Essential Health Interventions Program; CI = confidence interval.

Fig. 3 shows the effect of GEHIP on unmet need. The figure shows that unmet need rose in both intervention and comparison districts between the baseline and end line. The rate of increase was slightly higher in the comparison districts (from 31.7% to 44.8%) compared with the intervention regions (34.9% to 44.7%). The crude DID estimate is not significant (OR, 0.85; 95% CI, 0.64–1.12). This shows that the GEHIP project had no significant effect on unmet need for contraception.

Table 2 presents unadjusted baseline and end line contraceptive prevalence and unmet need levels for treatment and comparison areas. Although contraceptive use remained low, overall prevalence increased by 10 percentage points, representing a substantial change over the short 5 years of observation. Unmet need was virtually constant, however.

Table 3 presents the main results of the effect of GEHIP interventions on the use of modern contraceptives. The table reports ORs from logistic regression models along with the 95% CI. The crude model presents results without controlling for covariates. The extended model includes a rich set of covariates. At baseline, the use of modern contraceptives was slightly lower in the intervention districts compared to the comparison districts but this difference is not statistically significant (OR, 0.835; 95% CI, 0.587–1.187). Consistent with Ghana as a whole,⁴² there was slight, but non-significant increase in the use of modern contraceptives between the baseline and end line. The interaction term estimating the ATE was nonetheless statistically significant, showing that GEHIP had an impact on the use of modern

Table 2. Characteristics of GEHIP treatment and comparison area study respondent baseline and end line current contraceptive use and unmet need for limiting and spacing

No. of women	Baseline (2011)			End line (2015)			Change (2011–2015; percent change)	
	Intervention (n = 1,535)	Comparison (n = 1,608)	P-value	Intervention (n = 1,700)	Comparison (n = 1,608)	P-value	Intervention	Comparison
Percent currently using a modern contraceptive			0.03			0.00	+10.50 (+64.40)	+1.50 (+7.60)
Yes	16.40	19.20		26.90	20.70			
No	83.60	80.80		73.10	79.30			
Percent unmet need for contraception			0.01			0.49	+1.05 (+2.30)	–2.89 (–5.70)
No unmet need	46.24	50.71		47.30	47.80			
Unmet need for spacing	35.21	30.26		31.20	32.20			
Unmet need for limiting	18.55	19.03		20.70	19.80			

GEHIP = Ghana Essential Health Interventions Program.

Table 3. Effect of GEHIP on use of modern contraceptives among currently married women

Covariates	Crude model		Extended model	
	OR	95% CI	OR	95% CI
GEHIP intervention district	0.82	0.59–1.15	0.84	0.59–1.18
End line	1.09	0.89–1.36	1.11	0.89–1.38
GEHIP intervention ^a end line	1.71 ^c	1.26–2.31	1.79 ^c	1.32–2.44
Age group (yr)				
15–19 (ref.)			1.00	
20–24			1.76 ^b	1.11–2.79
25–29			2.01 ^c	1.27–3.17
30–34			2.08 ^c	1.37–3.14
35–39			1.84 ^c	1.19–2.83
40–44			1.30	0.83–2.06
45–49			0.72	0.43–1.20
Children ever born			1.09 ^c	1.04–1.14
Education				
No formal education (ref.)			1.00	
Primary/JHS			1.41 ^c	1.18–1.68
Secondary plus			1.28 ^a	0.95–1.73
Polygamous marriage				
No			1.00	
Yes			0.70 ^c	0.59–0.83
Religion				
Christian			1.00	
Traditional			0.86	0.69–1.06
Islam			1.05	0.83–1.33
No religion			0.75	0.44–1.27
Ethnic group				
Buli (ref.)			1.00	
Frafra			1.07	0.78–1.49
Kusasi			1.01	0.68–1.50
Others			0.84	0.60–1.18
Occupation				
No occupation			1.00	
Farming			1.49 ^b	1.05–2.13
Trading			1.65 ^c	1.17–2.33
Hairdressing/dressmaking			1.72 ^c	1.26–2.36
Student			2.19 ^b	1.18–4.10
Others			1.42 ^a	0.95–2.13
NHIS				
Not currently enrolled (ref.)			1.00	
Currently enrolled			1.24 ^b	1.05–1.47
Locality				
Urban (ref.)			1.00	
Semi-urban			1.03	0.67–1.59
Rural			1.07	0.72–1.59
Wealth index				
Poorest (ref.)			1.00	
Poorer			0.93	0.72–1.19
Middle			0.96	0.76–1.19
Richer			1.19	0.94–1.53
Richest			1.17	0.93–1.47
Constant	0.24 ^c	0.19–0.30	0.05 ^c	0.03–0.12
Observations		6,446		6,446
Pseudo-R ²		0.01		0.04
Wald chi-square		36.99		442.47

The sample used for these regressions are all currently married women in reproductive age (excluding infertile women and women who were currently pregnant). Table reports results from logistic regression models. In all regressions, standard errors are clustered at the enumeration area level.

GEHIP = Ghana Essential Health Interventions Program; OR = odds ratio; CI = confidence interval; JHS = junior high school.

^a $P < 0.1$; ^b $P < 0.05$; ^c $P < 0.01$.

contraceptives (OR, 1.795; 95% CI, 1.320–2.439). In absolute terms, the level of use remained low at the end of GEHIP, but the change in contraceptive use was pronounced (**Table 2**), with the change between baseline and end line the upturn representing an 80% increase in the GEHIP intervention districts relative to comparison districts, from 16.4% to 26.9% during the study period.

Table 3 also shows that the ORs on the covariates are largely consistent with expectation. There is a non-linear relation between age and use of modern contraceptives. Relative to women aged 15–19 years, the odds of contraceptive use increase up to those aged 30–34 years and then falls afterwards. The number of children ever born to a woman increases the likelihood of contraceptive use. An additional child born to women increases the OR by almost 10%. Education increases the likelihood of using modern contraceptives as those with primary and secondary education have higher odds of using contraceptives compared to those with no education. The type of marriage also affects use of contraceptives. Women in polygamous marriages are less likely to use modern contraceptives compared with those in monogamous marriages. Occupation of the woman also has an effect on contraceptive prevalence. Compared to women who reported having no occupation, women who are into farming, trading, hairdressing/dressmaking or other forms of occupation have higher odds of using modern contraceptives.

Finally, the results also suggest that insurance enrollment is associated with the use of modern contraceptives. Women who were currently enrolled in the NHIS were more likely to use modern contraceptives even though contraceptives are supposed to be free irrespective of insurance status. The results also indicate that religion, ethnicity, household wealth status and locality (rural or urban) all have no effect on the use of modern contraceptives.

The impact of GEHIP on unmet need.

The DID estimate in **Table 4** shows that the impact of GEHIP on reducing unmet need is not statistically significant. In fact, unmet need for contraception actually *increased* significantly between baseline and end line, although this trend occurred in all study areas and was unassociated with GEHIP.

Table 4 also shows that age, children ever born, religion, ethnicity and occupation all have statistically significant effect on unmet need for contraction. Older women are less likely to have unmet need for contraception even though here too, there appears to be nonlinearity in the effect. Women who have higher number of children ever born are more likely to have unmet need for contraception. In terms of education, women with secondary education or higher were surprisingly more likely to have unmet need for contraception. Women who practice Islam are less likely to have unmet need for contraception compared to those who are Christians. In terms of occupation, women who are traders or farmers were less likely to have unmet need for contraception. The type of marriage (monogamous or polygamous), enrollment status in the NHIS, household wealth status and locality type (rural or urban) had no effect on unmet need.

DISCUSSION

The results in **Table 4** contrast with results reported by international investigations of the determinants of unmet need. In particular, studies in other settings have found

Table 4. Effect of GEHIP on unmet need for contraception

Covariates	Crude model		Full model	
	OR	95% CI	OR	95% CI
GEHIP intervention areas	1.21 ^a	0.98–1.50	1.18	0.93–1.51
Follow-up period	1.23 ^a	0.98–1.54	1.23 ^a	0.98–1.55
GEHIP intervention ^a follow-up	0.85	0.64–1.12	0.83	0.64–1.11
Age group (yr)				
15–19 (ref.)			1.00	
20–24			0.89	0.65–1.23
24–29			0.61 ^c	0.44–0.84
30–34			0.52 ^c	0.37–0.73
35–39			0.43 ^c	0.29–0.64
40–44			0.46 ^c	0.32–0.68
45–49			0.90	0.59–1.38
Children ever born			1.16 ^c	1.12–1.21
Education				
No formal education (ref.)			1.00	
Primary/JHS			0.95	0.82–1.09
Secondary plus			1.04	0.79–1.36
Polygamous marriage				
Not in polygamous marriage (ref.)			1.00	
In polygamous marriage			0.99	0.89–1.11
Religion				
Christian (ref.)			1.00	
Traditional			0.94	0.81–1.09
Islam			0.92	0.77–1.09
Ethnic group				
Buli (ref.)			1.00	
Frafra			0.88	0.68–1.15
Kusasi			0.89	0.69–1.14
Others			0.90	0.71–1.14
Occupation				
No occupation (ref.)			1.00	
Farming			0.77 ^a	0.59–1.02
Trading			0.70 ^c	0.54–0.91
Hairdressing/dressmaking			0.74 ^b	0.57–0.97
Student			1.06	0.67–1.66
Other occupation			0.92	0.68–1.22
Insurance				
No insurance coverage			1.00	
Has insurance coverage			0.96	0.85–1.09
Locality				
Urban			1.00	
Semi-urban			0.91	0.68–1.22
Rural			0.99	0.75–1.32
Wealth index				
Poorest (ref.)			1.00	
Poorer			1.12	0.96–1.30
Middle			1.09	0.95–1.25
Richer			1.00	0.87–1.16
Richest			0.92	0.78–1.08
Constant	0.88	0.75–1.05	1.25	0.73–2.16
Observations	6,446		6,446	
Pseudo-R ²	4.83		396.08	
Wald chi-square	0.00		0.02	

The sample used for these regressions are all currently married women in reproductive age (15–49 years). Table reports results from logistic regression models. In all regressions, standard errors are clustered at the enumeration area level.

GEHIP = Ghana Essential Health Interventions Program; OR = odds ratio; CI = confidence interval; JHS = junior high school.

^a $P < 0.1$; ^b $P < 0.05$; ^c $P < 0.01$.

that educational attainment is associated with reduced unmet need and relatively high contraceptive use.⁴³ The desire to space childbearing in West African settings is pervasive, but this preference can be associated with customs that prolong post-partum abstinence or lactational amenorrhea that have little or no association with educational attainment or other variables that are commonly found to be covariates of reproductive preferences.⁴⁴ Spacing need is common, even among low parity women, without association with education, relative wealth, or other commonly observed associations. The unanticipated results reported in **Table 4** therefore merit further investigation.

This paper investigated whether strengthening community-based primary health care coverage in a poor rural setting of northern Ghana improved fertility regulation. Results show that GEHIP was associated with a statistically significant increase in modern contraceptives use. However, this outcome was not accompanied by an effect on unmet need for family planning. Very substantial demand for contraception remains, even if access to services is improved. This outcome is the possible consequence of GEHIP induced increased demand for contraception and use whereby overall demand increased more rapidly than the implementation of demand as actual use. These findings are consistent with other studies in Ghana showing that improvements in primary health care access can improve fertility regulation. Beginning with the Danfa Project's landmark demonstration that contraceptive prevalence increases with the provision of primary healthcare,^{45,46} and by the results of a Navrongo Health Research Centre trial,^{2,3} research has showed that demand for family planning was extensive and the provision of services could induce and sustain reproductive change.^{5,6} But, findings also suggest that social constraints to the implementation of reproductive preferences can persist in ways that sustain unmet need, even if contraceptive use is increasing.⁴⁷

Existing literature has shown that access to primary health care is defined by geographic proximity,⁴⁸ service quality,⁴⁹ clinical readiness^{50,51} or by health insurance schemes that promote access to health care that the poor would otherwise lack.^{48,52-54} The interventions under the GEHIP program improved primary care access by addressing constraints to use of primary health care that are associated with proximity to care. Our findings support the growing evidence that integrated health services strengthening benefits all aspects of the system, including contraceptive services.^{55,56} Effective improvement of geographic access, modality access, and quality assurance requires integrated operational designs in the mode of CHPS provided care. When the coverage of CHPS primary health care services was improved family planning use was directly affected.

But this result does not necessarily show that pent-up demand for family planning is fully addressed by improving geographic access to care. In fact, convenient services may generate demand at a pace of change that is equivalent to the pace of change in use, particularly if social constraints continue to prevent women from implementing their preferences.⁵⁷ GEHIP developed health services that are mainly located in the confines of community-based facilities. The original Navrongo experiment showed, however, that achieving results with convenience services had no effect unless a parallel program was in place that sponsored outreach to men, communication to communities, and gender-based support of women.^{6,58} Various studies are showing that as time has progressed, this social engagement component of CHPS has been allowed to atrophy,^{28,59-61} with the focus of community activities shifting to the provision of care in community health posts.⁶²⁻⁶⁴ Our findings show that GEHIP's expansion of convenient fixed facility services, as mandated by the UHC policy agenda, was associated with a significant impact on contraceptive use, but that unmet potential was

unaddressed with this approach. Our research has showed that GEHIP had a significant impact on childhood mortality,³³ but fertility effects were confined only marginal effects among young women.⁵⁹ This outcome suggests that a more comprehensive integration of health interventions with social engagement for promoting family planning could further the impact of CHPS on family planning and met need for contraception.

The persistence of unmet need in the context of successful implementation of UHC policy demonstrates the importance of revisiting implementation strategies for CHPS that succeeded during its pilot phase.^{3,65-67} In particular, this would involve reactivating strategies for engaging men in program activities though outreach to male social networks and support for women who are confronting spousal discord over their intention to adopt a method.⁵⁷

Developing community-based primary health care has become an internationally recognized priority component of policies aiming to achieve UHC.^{68,69} The GEHIP program in Ghana permits tests of the hypothesis that UHC oriented interventions will improve fertility regulation. The results from this paper show that strengthening health systems in rural African setting involving strategies to expand the coverage of community-based primary health care and improve the range and quality of the services provided has the additional benefit of increasing the use of modern contraceptives. However, a more comprehensive social engagement approach will be needed for Ghana's health program to improve its response to unmet need for contraception.

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