Socio-demographic heterogeneity in cost of accessing medication abortion: Insights from Ghana

Caesar Agula[a*], Yuliya Kulikova[b,c], Omkar Patange[b], Adriana Biney[a], Michael Kuhn[b], Pearl Kyei[a], Patrick Asuming[a], Ayaya A. Bawah[a]

[a] Regional Institute for Population Studies (RIPS), University of Ghana, Accra, Ghana
[b] Economic Frontiers Program, International Institute for Applied Systems Analysis (IIASA), Laxenburg, Austria
[c] Okinawa Institute of Science and Technology (OIST), Okinawa, Japan

[*] Corresponding author. Email addresses: caesaragula@gmail.com or cagula001@st.ug.edu.gh (C. Agula)

1. Introduction

It is estimated that six in ten unintended pregnancies result in abortion worldwide (Bearak et al., 2020), highlighting the significance of abortion in women's healthcare (Kapp and Lohr, 2020). In settings where abortion is restricted, many women choose to self-manage abortions with medication abortion (MA) pills when available (Conti & Cahill, 2019). The use of MA pills for ending pregnancies could enhance women's autonomy over their abortion decisions and might help them navigate abortion-related stigma (LaRoche and Foster, 2020; WHO, 2022). For example, they can choose a pharmacy or clinic to access MA and decide when and where to take the pills (LaRoche and Foster, 2020). They can also easily mitigate stigma from abortion providers and people close to them (Biggs et al., 2020). Medication abortion with mifepristone and misoprostol combination pills is safe and effective for managing pregnancies in early gestation (WHO, 2012, 2022). These combination pills are registered as essential medicines in Ghana (Ministry of Health (MoH).

In Ghana, the legal provisions for accessing abortion differ from reality. The current abortion law in the country, last amended in 1985, allows women to end pregnancies in licensed health facilities such as hospitals and clinics (referred to as clinic) by health professionals under conditions of rape, incest, fetal impairment and/or if carrying the pregnancy to term could potentially affect their psychological or physical health (Aniteye and Mayhew, 2019; Agula et al., 2021). The law did not include pharmacy providers in the provision of abortion services (Aniteye and Mayhew, 2019). However, in reality, MA is accessible in pharmacies without prescription from a health professional (Otsin et al., 2023).

Additionally, it is crucial to note that, like other developing countries, Ghana's healthcare system faces challenges, including the unavailability of medicinal commodities such as MA pills in some clinics (Ashigbie et al., 2016; Atiga et al., 2023). Moreover, elective abortions in clinics, whether

public or private, are not covered by the national health insurance scheme in Ghana (Ghana Health Service, 2014). To navigate around these health system challenges, health professionals in some clinics procure MA pills from the suppliers (e.g., MSI Reproductive Choices and DKT International) with their personal resources and manage the sales to clients.

Previous studies in Ghana and other developing settings have primarily focused on understanding abortion-related stigma and its effect on access to safe and high-quality abortion care (Rominski and Lori, 2014; Atakro et al., 2019; Boah et al., 2019; Khatri et al., 2019; Bell et al., 2020). The literature suggests that certain groups of women, such as adolescents, those in remote areas and those with limited knowledge about the legal framework for abortion, are more likely to experience stigma and therefore more inclined to end pregnancies using unsafe methods (Rominski and Lori, 2014; Biney and Atiglo, 2017; Atakro et al., 2019; Boah et al., 2019). In countries where legal restrictions and/or socio-cultural and religious stigma impede access to abortion services, women seeking abortions secretly may encounter inflated prices. Providers can exploit these women, who are desperate and lack sufficient information on the costs of abortion access (Moore et al., 2021). This situation is particularly possible in Ghana, where access to abortion is poorly regulated and abortion-related stigma exists (Aniteye et al., 2016; Lithur, 2004; Payne et al., 2013). Stigmatization may foster information asymmetry, allowing providers to practice price discrimination by targeting those more vulnerable or hesitant to seek lower prices (Mishra & Pandey, 2023). Additionally, the inelastic demand for abortion services may allow providers to charge higher prices without a significant demand reduction. Geographic location may also play a role. Urban areas generally have better healthcare infrastructure than rural areas, and this may lead to higher prices in urban areas (Liu, 2024). Furthermore, women may self-select into different abortion service providers. For example, more educated women, who may possess better information and understanding of price differences among providers, might also choose higher-quality health facilities with higher prices (Zimmerman & Woolf, 2014).

Considering these factors, this paper aims to explore potential heterogeneities in the cost of accessing MA services by socio-economic status and understand potential mechanisms. The cost of MA was estimated from the perspective of the client. Understanding cost disparities across socio-demographic groups is essential to promote equity, guide policy decisions, formulate strategies to reduce barriers and enhance equal access to safe abortion care. These efforts not only help to reduce the incidence of unsafe abortion-related fatalities, but also contribute to improved public health outcomes. Moreover, they aid in alleviating the financial burden disproportionately borne by vulnerable population groups.

2. Socio-demographic attributes and cost of abortion nexus: a review of the literature

Generally, there is limited evidence on the relationship between cost of abortion and women's socio-demographic attributes. Most of the studies identified are largely concentrated in the United States and Asia (Murthy and Creinin, 2005; Ely et al., 2017; Coast et al., 2021; Johnson et al.,

2021; Moore et al., 2021). Evidence from low-income, disadvantaged abortion patients in the United States shows that younger women tend to spend more to obtain abortion services compared to older women (Ely et al., 2017). The evidence further indicates that those married incurred more costs to end the pregnancies (Ely et al., 2017). Most of the married women seeking abortion opted for relatively expensive procedures. Evidence from India is the opposite: most unmarried women accessed abortion at private clinics, where the costs are higher (Sundar, 2003). The existing literature does not focus on patients who received MA. Moreover, the designs and methods do not suffice for a realistic comparison of abortion patients. For instance, the gestation of the pregnancies varies significantly among patients, and the procedure and cost components are expected to vary by case (Coast et al., 2021; Roberts et al., 2014).

Studies conducted in parts of sub-Saharan Africa (SSA) also show that the cost of abortion may differ depending on the socio-demographic characteristics of women (Ilboudo et al., 2015; Leone et al., 2016). Women classified as poor based on their household wealth index tend to pay higher prices to obtain abortion services in countries like Zambia (Leone et al., 2016) and Burkina Faso (Ilboudo et al., 2015). However, as in the United States and India, MA was not the focus of these studies, and they do not enable the comparison of costs for women who have received similar MA pills from either pharmacy or clinical settings.

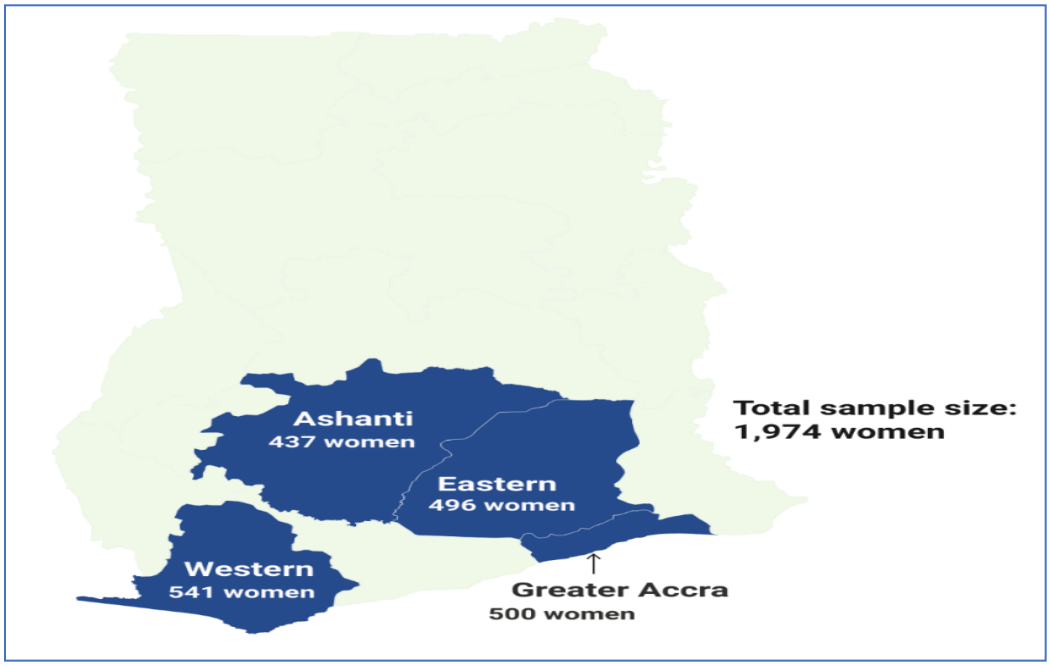
Other factors such as geographic location and the type of facility may also be associated with the cost of abortion (Leone et al., 2016; Jones et al., 2019; Gbagbo, 2020). For example, Gbagbo (2020) evinced that in Accra, Ghana, the cost of abortion in hospitals, where surgical procedures are predominantly performed, is higher than in pharmacies, where MA is predominantly obtained. Additionally, a woman in a rural setting, where the health facilities provide limited abortion services, may incur additional transportation costs to obtain her preferred abortion method in other locations.

3. Methods and materials

3.1. Study settings

This research utilized data from a project titled Medical Abortion Out of Clinic in Ghana (MOC-Ghana). The project was spearheaded by the Regional Institute for Population Studies (RIPS) and Ipas International (Ipas) with support from MSI Reproductive Choices. The MOC-Ghana project aimed to test the null hypothesis that the clinical outcome (completed abortion) of using mifepristone and misoprostol combination pills obtained from pharmacies is not unacceptably worse than from clinics. The project was carried out in four regions in Ghana, namely Greater Accra, Ashanti, Eastern and Western regions (Figure 1). These regions were selected because they are more diversified in culture and have a high prevalence of abortion (GSS et al., 2018).

Figure 1: A map of Ghana with study regions and the analytic sample



Source: Authors' construction (2023)

3.2. Design

The MOC-Ghana project employed a prospective and non-inferior design to recruit pharmacies and licensed clinics providing MA services with mifepristone and misoprostol combination pills, specifically Mariprist and MM combi kit. Women with pregnancies less than 9 weeks gestation were recruited after obtaining MA pills and exiting the facilities. A woman's last mensuration period was used to determine/confirm pregnancy gestation. As part of the recruitment process, the contact information of these women was collected and used to conduct phone interviews after the recruitment. Three sequential prospective surveys were conducted at 3-7 days, 10-29 days and 30-35 days after the recruitment. The first survey, 3-7 days post-recruitment, primarily aimed to confirm whether the woman had initiated the termination process by taking the MA pills and to gather information on the cost of MA. The subsequent surveys at 10-29 days and 30-35 delved into understanding the experiences of women after taking the medication.

3.3. Sample size

The MOC-Ghana study used a multi-level procedure to determine its sample size. Initially, a power calculator for a binary outcome non-inferiority design was used to calculate the sample size, resulting in 1,108 women (Walker, 2019). This calculation was based on 80 percent power (β = 0.2), a one-sided confidence level of 97.5 percent (α = 0.025) and a primary outcome (need for a repeat abortion after using MA pills) of 6 percent, based on a previous study (Kahn et al., 2000).

To address potential cluster effects within facilities, the sample size was increased. An intra-cluster correlation coefficient (ρ) equal to 0.01 and cluster size (m) of 50 were used, resulting in a design effect of 1.49. Further, the design effect and a 20 percent attrition were applied to the initial sample size (1108*1.49*1.2), resulting in a total sample size of 1,981 women. However, 1,974 women (1045 from clinics and 929 from pharmacies) had complete data from all the follow-up surveys and were used for analysis.

3.4. Sampling procedure

The MOC-Ghana study focused on facilities that offer MA with Mariprist/MM combi kit. To recruit facilities, the research team carried out an initial exploratory visit to the study areas with support from Ghana Health Service (GHS), MSI Reproductive Choices and the Pharmacy Council of Ghana to assess facilities that met certain criteria. These criteria included: 1. providing MA with Mariprist/MM combi kit, 2. having demand for MA pills, 3. not requiring a physician's prescription (especially for pharmacies) and 4. being located near another facility that allows women to choose from. For example, a clinic should have at least one nearby (about 1-kilometer distance) pharmacy that provides similar services to give clients more options. The team recruited 12 pharmacies and 10 clinics from all regions.

To gather data, women who independently obtained MA from the study's facilities were recruited after giving their consent to participate in the research study. These women were in their early stages of pregnancy, with gestation less than nine weeks. Research Assistants (RAs) with at least a first degree were trained by RIPS and assigned to the recruited pharmacies and clinic-based facilities in the study areas. Women who came to obtain MA were briefly informed about MOC-Ghana by the service providers and referred to the RAs for recruitment. The RAs then provided the clients with in-depth information about the study. They also collected clients' background information such as phone number, age, and gestational age of pregnancy for follow-up phone interviews. To ensure that follow-up phone interviews were conducted for actual recruited women, an easy memorable security code was established between the RAs and respondents.

3.5. Data collection

Data for MOC-Ghana were collected between the periods December 2019 to March 2020 and July 2020 to April 2021. There was a break in data collection due to the COVID-19 pandemic. The RAs collected data through electronic devices, specifically tablets, utilizing CommCare software. The data collected during the interview include socio-demographic characteristics of women, their previous abortion background, the cost of purchasing MA pills and the average time spent in accessing MA pills. Aside from the face-to-face recruitment of women, all follow-up interviews were conducted through phone calls.

3.6. Measures

Dependent variable

There are several material and immaterial cost components associated with accessing MA. These include the cost of MA pills, ultrasound screening, transportation, productive time lost, and social stigma. There are also varying perspectives on estimating abortion costs (Garrison et al., 2018; Kim et al., 2020). This could be from the standpoint of the client, provider, payer, society, etc. (Garrison et al., 2018). For this study, MA cost was estimated from the client's perspective. Due to data constraints, the total MA cost (in Ghana cedi) comprised two cost components: 1. the amount paid by women for MA pills and 2. the time spent waiting at the facility to access the service (opportunity cost). During the survey, clients were asked about the cost of MA pills purchased at a specific site, and the amount (in Ghana cedi) was recorded. The average waiting time clients spent to access MA was collected, and the cost (in Ghana cedi) was estimated. The waiting time cost was estimated based on the per-capita income of Ghana for the year 2020. The year 2020 was used because over 90 percent of the interviews were conducted during that year. The amount (cedi value) a Ghanaian contributes every 1 minute was calculated from the per-capita income and used to estimate the cost of waiting time for the clients in each facility. This is a standard approach for estimating healthcare costs for economic evaluations (Johannesson, 1996).

Independent variables

Based on the abortion literature in Ghana (Gbagbo et al., 2015; Ganle et al., 2019; Gbagbo, 2020; Agula et al., 2021), we conceptualized women's socio-demographic characteristics as the main predictors of MA cost. Specifically, the woman's age group (<= 24 years and >24 years), marital status (never in union and currently/formerly in union), number of live births, level of education (no formal education, basic-primary/junior high school, secondary and tertiary/higher) and occupation (professional/managerial, service, skilled manual, unskilled manual, student and unemployed) were used as the main predictors.

In addition, we considered and controlled for other observable factors that may mediate between the main independent variables and the dependent variable or may directly affect the dependent variable. These factors include place of residence (city, town and village/rural area), study region (Ashanti, Eastern, Greater Accra and Western), clinic-based access (yes and no), learning about MA from a friend (yes and no), learning about MA from a family member (yes and no), learning about MA from the internet (yes and no) and previous abortion history (yes-with medication, yes-with surgical method and no previous abortion)

Data on women's wealth index scale and religion were not collected. As such, these variables were not included in the analysis.

3.7. Analysis

First, descriptive analysis of the cost of MA was conducted for every facility. For the convenience of exposition, we present them in groups: clinic and pharmacy. Substantial differences in MA cost were observed among facilities of each group, whether clinics or pharmacies. The variance in MA cost was analyzed for each facility group, decomposing it into its within-group and between-group components, utilizing the standard ANOVA method.

Moreover, substantial difference in MA cost was observed between clinics and pharmacies. To shed light on the cost difference between accessing MA from clinic and pharmacy providers, a decomposition analysis was conducted using the Blinder-Oaxaca two-fold pooled approach (Jann, 2008; Rahimi and Hashemi Nazari, 2021). The Blinder-Oaxaca decomposition analysis dissects the average cost difference between clinic and pharmacy access, revealing the contributions of group differences in women's attributes, such as socio-demographic and geographic location. Additionally, it identifies the remaining cost that is unexplained by women's characteristics. See Appendix 1 for details on the theory underpinning the Blinder-Oaxaca decomposition analysis.

Finally, we employed a multivariate linear regression model to investigate the relationship between women's socio-demographic attributes and the cost of MA. The most comprehensive specification of the model is outlined below:

$$CT_{ij} = \delta + \beta_1 AG_i + \beta_2 MS_i + \beta_3 LB_i + \beta_4 ED_i + \beta_5 OC_i + \gamma_1 RE_i + \gamma_2 RG_i + \pi_1 CL_i + \varphi_1 FD_i + \varphi_2 FM_i + \varphi_3 IN_i + \varphi_4 PA_i + \alpha_j + \varepsilon_i, \quad (1),$$

where CT_{ij} – is the cost of MA pill paid by the woman *i* at the facility *j*, $\delta -$ is the constant term, AG_i – is individual's age, MS_i – is dummy for marital status, LB_i – number of live births, ED_i – set of dummies for education, OC_i – set of dummies for occupation, RE_i – set of dummies for place of residence, RG_i – set of dummies for study site, CL_i – dummy for clinic access, FD_i – dummy for learning about MA from a friend, FM_i – dummy for learning about MA from a family member, IN_i – dummy for learning about MA from the internet, PA_i – set of dummies for previous abortion methods used, α_j – facility fixed effect (set of dummies for each of the facilities), ε_i – error term.

To gain better understanding of the factors contributing to the variations in cost in each group, disaggregated regression analyses were conducted for clinic and pharmacy clients. In addition, for robustness, we run the regression only with those facilities that have substantial variations in MA cost.

Furthermore, we augmented our dataset by incorporating contextual information to investigate whether the variations in MA cost across the various facilities could be explained by local factors. The collected data includes the district in which each facility is located (11 districts identified), districts' population density (number of people per km^2), proximity of the facility to a major road (categorized as <=100 m, 101m-500m, >500m), nature of area in which the facility is located (low-

income, middle-income, or central business) and availability of nearby competitors. Bivariate linear regression analyses were conducted using coefficient of variation in MA cost estimated for each facility from the MOC-Ghana data as the outcome variable, against the context information collected.

In this study, covariates deemed statistically significant were identified based on probability values less than 5 percent. Additionally, post-estimation tests, including assessments for heteroskedasticity and multicollinearity, were conducted to ensure our estimates are reliable.

3.8 Ethical considerations

Approvals from the Ghana Health Service Ethics Review Committee (GHS-ERC012/07/19), University of Ghana Ethics Committee for the Humanities (ECH 034/19-20) and Marie Stopes International Ethics Review Committee (025-19) were obtained for the MOC-Ghana study.

4. Results

4.1. Background characteristics of women

Table 1 shows descriptive statistics on women's socio-demographic, geographical location and abortion-related characteristics, overall and by type of service provider. Approximately 46 percent of the women were identified as young (<=24 years), with a greater share of these young women (56 percent) obtaining MA from clinics. The majority (69 percent) of women were never in union with a partner. Disaggregated data reveals a higher proportion (55 percent) of those who had never been in union being clinic clients. The average number of live births among the entire sample was about one, driven largely by the pharmacy group. Furthermore, almost all women had some form of formal education. Notably, a greater share (69 percent) of the higher-educated women received MA in clinical settings. About 19 percent of the women were identified as students, with 59 percent of them obtaining MA in clinics. A few of the women (4 percent) reported living in villages, and a bigger share (55 percent) of them received MA from pharmacy providers.

Additionally, results in Table 1 show that about 21 percent of the sample previously had MA before their recent MA. About 6 in 10 of those who previously had MA received the service from pharmacy providers. A little over half of the women (54 percent) learned about MA from their friends, and 50 percent of them obtained MA in pharmacies.

Table 1: Women's socio-demographic, geographic location and abortion-related attributes, by type of MA provider

Variable	Pharmacy (%)	Clinic (%)	Total sample	
			Row (%)	Column (%)
Age category**				
<=24 years	403 (44.1)	511 (55.9)	914 (100.0)	914 (46.3)
>24 years	526 (49.6)	534 (50.4)	1060 (100.0)	1060 (53.7)
Marital status**				
Currently/formerly in union	314 (51.2)	299 (48.8)	613 (100.0)	613 (31.1)
Never in union	615 (45.2)	746 (54.8)	1361 (100.0)	1361 (68.9)
Number of live births, mean (SD)***	1.1 (3.5)	0.7 (1.2)	0.9 (2.6)	
Level of education***				
No education	19 (57.6)	14 (42.4)	33 (100.0)	33 (1.7)
Basic: Primary/JHS	298 (59.5)	203 (40.5)	501 (100.0)	501 (25.4)
Secondary	392 (53.2)	345 (46.8)	737 (100.0)	737 (37.3)
Tertiary/higher	220 (31.3)	483 (68.7)	703 (100.0)	703 (35.6)
Occupation***				
Professional/managerial	135 (37.6)	224 (62.4)	359 (100.0)	359 (18.2)
Service	312 (55.7)	248 (44.3)	560 (100.0)	560 (28.3)
Skilled manual	100 (45.3)	121 (54.7)	221 (100.0)	221 (11.2)
Unskilled manual	115 (56.7)	88 (43.3)	203 (100.0)	203 (10.3)
Student	156 (41.2)	223 (58.8)	379 (100.0)	379 (19.2)
Unemployed	111 (44.1)	141 (55.9)	252 (100.0)	252 (12.8)
Place of residence***				
City	321 (58.5)	228 (41.5)	549 (100.0)	549 (27.8)
Town	566 (42.0)	783 (58.0)	1349(100.0)	1349 (68.3)
Village/Countryside/Rural	42 (55.3)	34 (44.7)	76 (100.0)	76 (3.9)
Study site/region***				
Ashanti	201 (46.0)	236 (54.0)	437 (100.0)	437 (22.2)
Eastern	309 (62.3)	187 (37.7)	496 (100.0)	496 (25.1)
Greater Accra	191 (38.2)	309 (61.8)	500 (100.0)	500 (25.3)
Western	228 (42.1)	313 (57.9)	541 (100.0)	541 (27.4)
Previously had abortion				
Yes, with medication	248 (58.9)	173 (41.1)	421 (100.0)	421 (21.3)
Yes, through surgical	77 (46.4)	89 (53.6)	166 (100.0)	166 (8.4)
No previous abortion	604 (43.6)	783 (56.4)	1387 (100.0)	1387 (70.3)
Learned about MA from friend				
Yes	529 (50.2)	525 (49.8)	1054 (100.0)	1054 (53.4)
No	400 (43.5)	520 (56.5)	920 (100.0)	920 (46.6)
Learned about MA from family member				
Yes	177 (65.8)	92 (34.2)	269 (100.0)	269 (13.6)
No	752 (44.1)	953 (55.9)	1705 (100.0)	1705 (86.4)
Learned about MA from internet				
Yes	117 (32.0)	249 (68.0)	366 (100.0)	366 (18.5)
No	812 (50.5)	796 (49.5)	1608 (100.0)	1608 (81.5)
Observations	*929*	*1045*	*1974*	*1974*
*Chi-square test: *p<0.1, **p<0.05, ***p<0.01; Note: Mean comparison t-test was performed for live births*				

JHS: Junior High School; SD- Standard deviation

4.2. Cost of accessing MA and variations in cost

The primary cost component incurred by women for MA was the cost of the pills (Table 2). The average cost of obtaining MA, for the entire sample, was about GH₵ 205.00 (equivalent to US$ 35.80 in June 2020), comprising of costs of pills (GH₵ 203.00 (US$ 35.60)) and time spent at the facility (GH₵ 2.00 (US$ 0.30)). Results further show that women who sought MA from clinics incurred an additional cost of GH₵ 125.00 (US$ 21.90) compared to their counterparts who went to pharmacies.

Table 2: Components of MA cost

Variable	Pharmacy (%)	Clinic-based (%)	Total sample (%)
Total cost, mean (SD)* **	138.9 (44.8)	264.2 (105.8)	205.2 (103.8)
Cost of pills***	138.3 (44.8)	261.5 (106.0)	203.5 (103.3)
Cost of time spent at facility***	0.5 (0.1)	2.7 (0.8)	1.7 (1.2)
Observations	*929*	*1045*	*1974*
*Mean comparison t-test: *p<0.1, **p<0.05, ***p<0.01*			

Furthermore, results from the box and whisker plots suggest that the cost of obtaining MA differs across the facility types and within each specific facility (see Figure 2). Upon further examination of the variance decomposition, it becomes evident that a substantial portion of the variance among clinics stems from differences between facilities (78 percent). In contrast, among the pharmacies, the predominant source of variation is within facilities, accounting for 57 percent of the total variance (see Figure 3).

Figure 2: Distribution of MA cost in facilities

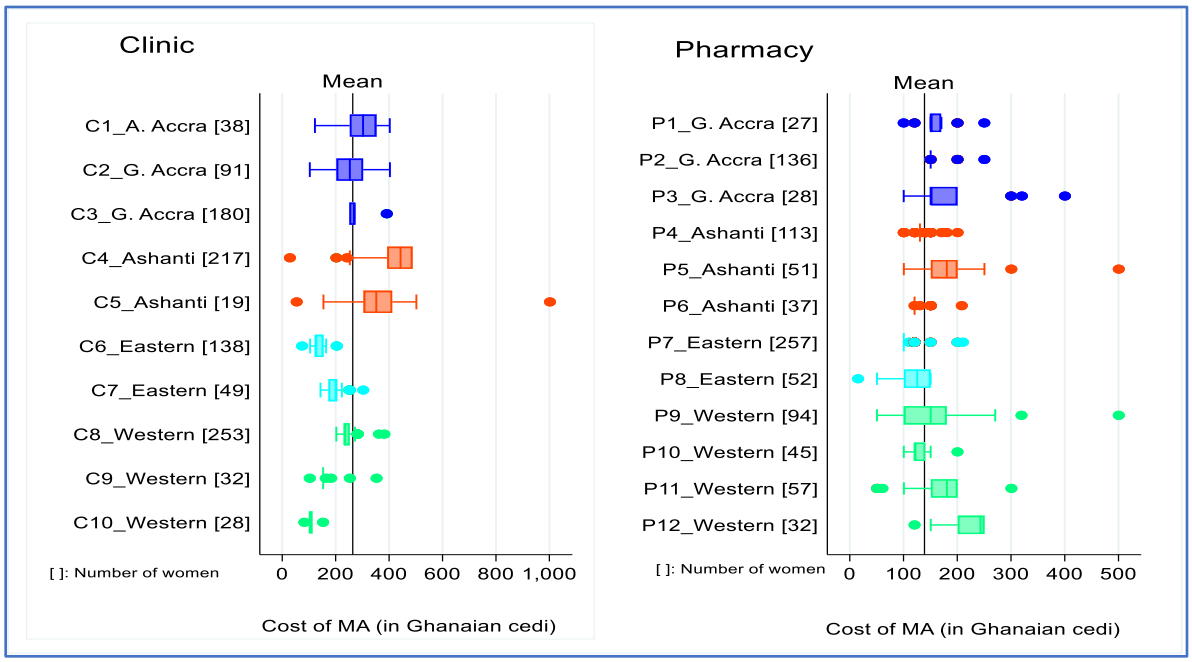
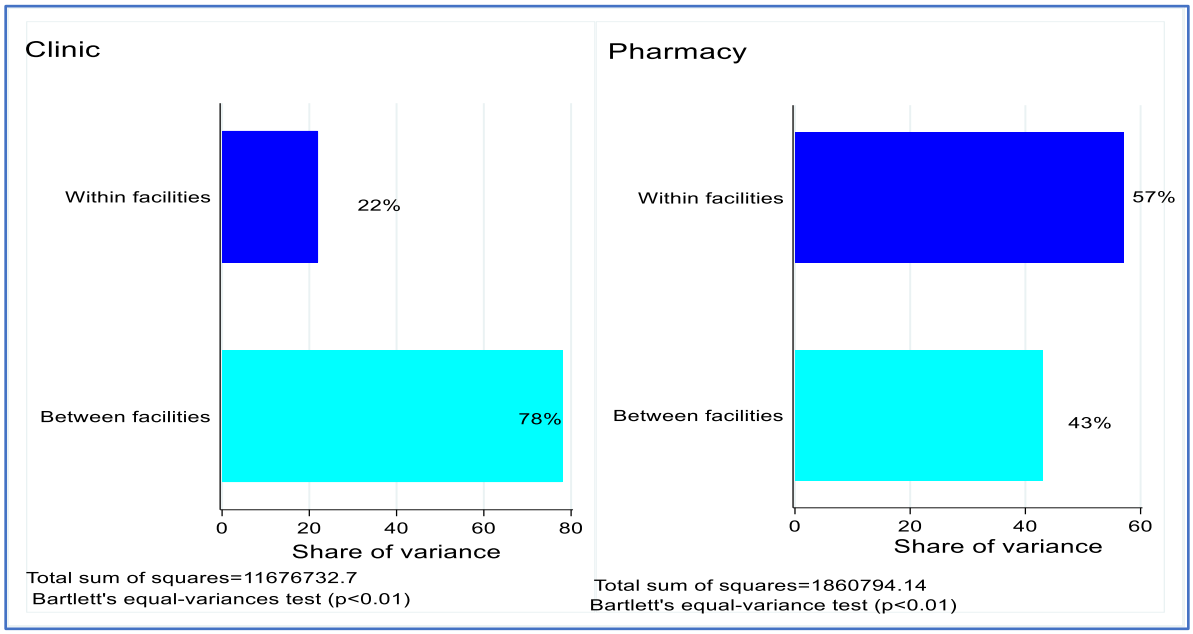


Figure 3: Variance decomposition of MA cost: within and between facilities



To delve deeper into understanding the source of disparity across types of facilities, a Blinder-Oaxaca decomposition analysis was conducted (see Table 3). This analysis shows how much of the difference in the average cost of obtaining MA from either a clinic or pharmacy could be explained by women's attributes, as well as the share that cannot be explained. About 16 percent (GH₵ 19.9 (US$ 3.5)) of the average cost difference (GH₵ 125.4 (US$ 21.9)) in accessing MA at a clinic is explained by differences in women's characteristics, although this is not statistically

significant. The 84 percent (GH₵ 105.5 (US$ 18.4)) cannot be explained by differences in women's attributes. See Appendix 2 for the full results.

Table 3: Blinder-Oaxaca two-fold decomposition analysis

Type of provider	Cost of medication abortion in GHS (95 CI)
Pharmacy	138.9 (136.0, 141.8)***
Clinic-based	264.2 (257.8, 270.7)***
Difference	-125.4 (-132.4, -118.3)***
Explained (endowments effect)	-19.9 (-51.5, 11.8)
Unexplained	-105.5 (-137.6, -73.5)***
95% confidence intervals in brackets	
** p<0.1, ** p<0.05, *** p<0.01*	

4.3. Determinants of MA cost

Table 4 presents the multivariate regression results detailing the factors associated with cost of obtaining MA for the entire sample and across different levels. Postestimation heteroskedasticity and multicollinearity test results are available in Appendix 3.

Generally, the results suggest that it is important to take differences across facilities into account. Beyond the primary independent variables, controlling exclusively for geographic location factors reveals that the number of live births, level of education and having a manual (skilled/unskilled) job are socio-demographic attributes that significantly predict the cost at which women obtain MA (see column (1) of Table 4). However, after accounting for facility fixed effect (see columns (3) and (4) of Table 4), the number of live births, having basic education and never being in union with a partner were found to significantly predict MA cost. After incorporating facility fixed effect, the significance of having a manual job and having no education disappears, while the variable 'never in union' becomes statistically significant. This suggests that there may be a form of selection occurring across distinct facilities. The results from our most comprehensive model (4) suggest that, on average, women who were never in a union, compared to those currently/formerly in union, incurred about GH₵ 5.1 (US$ 0.9) more to obtain MA, holding other factors constant ($p<0.05$). In contrast, women with basic education, compared to those with tertiary education, incurred a lower cost (GH₵ -7.1/US$ -1.2) to access MA ($p<0.05$). An additional live birth from a woman also reduces her cost by GH₵ -0.9/US$ -0.2 ($p<0.05$).

Apart from socio-demographic factors, geographic location, MA access at a clinic and exposure to MA information from the internet were found to significantly predict the cost of obtaining MA, even after accounting for facility-fixed effects (see column (4) of Table 4). The results indicate that clinic clients, compared to pharmacy clients, incurred an additional GH₵ 105.5 (US$ 18.0) to obtain MA on average ($p<0.01$). Women who live in towns, compared to city dwellers, incurred

extra cost (GH₵ 9.2/US$ 1.5, p<0.01) to access MA. In addition, compared to Greater Accra, women who obtained MA in the Western region averagely incurred extra cost (GH₵ 36.4/US$ 6.0, p<0.01) for MA. Conversely, women who accessed MA in Ashanti (GH₵ -59.5) and Eastern (GH₵ -64.5) regions incurred lesser costs compared to their counterparts who obtained similar services in Greater Accra. Women who learned about MA from the internet also spent less (GH₵ -7.7) to obtain MA.

Additional results from the breakdown analysis based on type of provider are shown in Table 5. We performed separate regressions for women who received MA from pharmacies and for those who obtained the service from clinics based on the most comprehensive model (column 4 of Table 4). After this, we limited the samples for the pharmacy and clinic groups to only those facilities for which we observed substantial variation in cost (excluding those that do not have within-facility variation in MA cost). The results, overall, are robust to sample selection. Running the analysis based on these samples, the results overall suggest disparities in cost of accessing MA in both pharmacies and clinical settings based on women's socio-demographic attributes. The cost of accessing MA significantly varies among clinic clients based on the number of live births a woman had and her educational level. The cost of obtaining MA reduces by about GH₵ -4.1 (US$ -0.7) with an additional live birth for clinic clients. Similarly, the cost reduces by GH₵ -12.6 (US$ -2.0) for clinic clients with a basic level of education compared to those with higher education. The cost reduction is even higher (GH₵ -14.3/US$ -2.4) for those with a basic level of education when the regression is limited to facilities with greater variation in cost. Also, the internet lowered the cost of MA only for clinic clients (GH₵ -13.4/US$ -2.3).

On the other hand, MA cost significantly varies among pharmacy clients based on marital status and number of live births. For example, women never in union versus those currently/formerly in union spent about GH₵ 7.7 (US$ 1.4) more to obtain MA. The cost of obtaining MA also falls (GH₵ -0.6/US$ -0.1, p<0.05) with an additional live birth, and the marginal effect is even higher when pharmacies without substantial variations in cost are filtered out (GH₵ -9.0/US$ -1.6, p<0.01).

Overall, the disaggregated results on geographic location, facility level and other abortion-related factors support the findings for the entire sample.

Table 4: Multivariate regression result of the predictors of MA cost-total sample

Variable (reference category)	(1) Estimate (95% CI)	(2) Estimate (95% CI)	(3) Estimate (95% CI)	(4) Estimate (95% CI)
Age (<= 24 years)				
>24 years	-3.9	3.5	-0.1	-0.5
	(-13.0, 5.2)	(-3.8, 10.67)	(-5.2, 5.0)	(-5.4, 4.4)
Marital status (Currently/formerly in union)				
Never in union	5.6	3.9	4.8**	5.1**
	(-3.4, 14.7)	(-3.1, 10.9)	(0.2, 9.4)	(0.5, 9.6)
Number of live births	-2.7***	-2.0***	-0.8**	-0.9**
	(-4.2, -1.2)	(-3.3, -0.7)	(-1.7, -0.0)	(-1.7, -0.0)
Education (Tertiary/higher)				
No education	-47.4***	-23.3	9.8	8.6
	(-79.6, -15.2)	(-52.6, 6.0)	(-14.4, 34.0)	(-15.5, 32.7)
Basic: Primary/JHS	-61.6***	-31.9***	-5.9*	-7.1**
	(-73.8, -49.3)	(-41.4, -22.5)	(-12.4, 0.6)	(-13.7, -0.6)
Secondary	-41.2***	-15.2***	-1.4	-2.5
	(-52.1, -30.3)	(-23.7, -6.7)	(-6.7, 4.0)	(-7.8, 2.8)
Occupation (Professional/managerial)				
Service	5.8	4.4	-0.9	-1.9
	(-7.2,18.7)	(-5.2, 14.0)	(-6.8, 4.9)	(-7.8, 4.0)
Skilled manual	28.6***	19.0***	3.6	2.8
	(12.4, 44.8)	(6.5, 31.6)	(-4.9, 12.0)	(-5.8, 11.3)
Unskilled manual	18.0**	16.9**	-1.7	-2.7
	(0.1, 35.9)	(1.7, 32.0)	(-14.1, 10.7)	(-15.2, 9.8)
Student	2.9	3.7	-3.6	-4.2
	(-10.7, 16.4)	(-6.5, 13.8)	(-10.3, 3.0)	(-10.9, 2.5)
Unemployed	6.1	2.6	-2.8	-3.7
	(-8.1, 20.4)	(-7.8, 12.9)	(-9.2, 3.5)	(-10.1, 2.7)
Woman's place of residence (City)				
Town	32.7***	12.4***	9.2***	9.2***
	(25.0, 40.5)	(6.2, 18.6)	(3.7, 14.8)	(3.7, 14.8)
Village/rural Area	30.4***	14.5*	2.8	2.8
	(14.8, 46.0)	(-0.4, 29.4)	(-10.4, 16.1)	(-10.4, 16.1)
Study site/region (Greater Accra)				
Ashanti	55.2***	70.1***	-58.3***	-59.5***
	(40.7, 69.7)	(59.6, 80.5)	(-83.7, -32.9)	(-85.2, -33.8)
Eastern	-86.2***	-67.5***	-63.8***	-64.5***
	(-93.7, -78.7)	(-73.9, -61.0)	(-90.4, -37.2)	(-91.4, -37.7)
Western	-32.6***	-26.0***	37.1***	36.4***
	(-41.0, -24.1)	(-32.9, -19.2)	(9.8, 64.3)	(9.0, 63.7)
Clinic (Pharmacy)		108.6***	106.2***	105.5***
		(102.2, 114.9)	(73.8, 138.6)	(73.1, 137.9)
Facility fixed effect			√	√
Learned about MA from a friend (No)				
Yes				-0.3

Variable (reference category)	(1) Estimate (95% CI)	(2) Estimate (95% CI)	(3) Estimate (95% CI)	(4) Estimate (95% CI)
				(-5.4, 4.8)
Learned about MA from a family member/relative (No)				
Yes				-1.3
				(-8.1, 5.4)
Learned about MA from the internet (No)				
Yes				-7.7**
				(-13.6, -1.8)
Previously had an abortion (No previous abortion)				
Yes: MA				1.2
				(-4.9, 7.3)
Yes: Surgical procedure				-0.2
				(-6.6, 6.1)
Constant	224.5***	152.6***	178.2***	181.6***
	(209.6, 239.4)	(140.9, 164.4)	(151.6, 204.8)	(154.2, 209.0)
Observations	*1974*	*1974*	*1974*	*1974*
Prob > F	*0.00*	*0.00*	*0.00*	*0.00*
R^2	*0.4*	*0.6*	*0.8*	*0.8*
JHS: Junior High School; 95% confidence intervals in brackets				
** p<0.1, ** p<0.05, *** p<0.01*				

Table 5: Multivariate regression result of the predictors of MA cost-segregated sample

Variable (reference category)	All facilities		Only facilities with disparities in MA cost ππ	
	Pharmacy Estimate (95% CI)	Clinic Estimate (95% CI)	Pharmacy Estimate (95% CI)	Clinic Estimate (95% CI)
Age (<= 24 years)				
>24 years	-0.5	2.8	5.5	4.7
	(-6.3, 5.4)	(-5.8, 11.4)	(-9.3, 20.3)	(-6.2, 15.7)
Marital status (Currently/formerly in union)				
Never in union	7.7***	-1.9	10.9*	-1.4
	(2.8, 12.6)	(-9.8, 6.1)	(-1.4, 23.1)	(-11.0, 8.2)
Number of live births	-0.6**	-4.1***	-9.0***	-5.3***
	(-1.2, -0.1)	(-7.0, -1.3)	(-14.6, -3.3)	(-8.9, -1.7)
Education (Tertiary/ higher)				
No education	23.4	-6.0	68.2	-3.2
	(-10.4, 57.2)	(-36.4, 24.3)	(-16.6, 153.1)	(-35.0, 28.6)
Basic: Primary/JHS	-0.0	-12.6**	7.3	-14.3**
	(-7.7, 7.7)	(-23.6, -1.5)	(-9.3, 23.9)	(-27.0, -1.5)
Secondary	-1.0	-2.4	-0.2	-2.2
	(-8.4, 6.4)	(-9.9, 5.0)	(-16.9, 16.0)	(-11.2, 6.7)
Occupation (Professional/managerial)				
Service	1.1	-3.1	4.1	-5.0

	(-6.4, 8.6)	(-12.2, 6.1)	(-14.9, 23.1)	(-16.5, 6.4)
Skilled manual	9.1	-3.3	15.8	-4.8
	(-3.5, 21.7)	(-14.6, 8.0)	(-9.8, 41.5)	(-17.2, 7.6)
Unskilled manual	-5.4	1.5	-5.2	1.0
	(-15.6, 4.7)	(-22.6, 25.6)	(-26.1, 15.8)	(-27.6, 29.6)
Student	-0.5	-5.7	-4.4	-7.8
	(-9.8, 8.8)	(-14.9, 3.6)	(-29.1, 20.3)	(-19.5, 3.9)
Unemployed	1.3	-7.2	5.9	-10.6*
	(-7.4, 10.1)	(-16.3, 1.8)	(-14.0, 25.8)	(-22.5, 1.4)
Woman's place of residence (City)				
Town	0.7	14.7***	1.3	20.1***
	(-6.2, 7.5)	(6.8, 22.7)	(-16.8, 19.3)	(10.2, 30.0)
Village/rural area	1.9	-2.8	-10.1	0.4
	(-8.2, 12.1)	(-28.8, 23.2)	(-34.6, 14.4)	(-26.7, 27.6)
Study site/region (Greater Accra)				
Ashanti	-35.3***	74.7*	15.2	73.8*
	(-48.5, -22.1)	(-7.8, 157.2)	(-4.2, 34.7)	(-8.3, 155.8)
Eastern	-42.7***	-91.7***	-38.8***	-91.2***
	(-58.3, -27.1)	(-114.9, -68.4)	(-57.0, -20.5)	(-114.7, -67.8)
Western	63.3***	-184.9***	65.3***	-55.2***
	(47.1, 79.5)	(-206.5, -163.4)	(46.8, 83.8)	(-77.0, -33.4)
Facility-level effect	√	√	√	√
Learned about MA from the internet (No)				
Yes	-0.3	-13.4***	-3.3	-13.4***
	(-8.4, 7.8)	(-21.2, -5.6)	(-20.2, 13.6)	(-23.4, -3.4)
Constant	155.7***	295.7***	152.5***	294.2***
	(140.2, 171.2)	(271.0, 320.4)	(124.1, 180.9)	(267.5, 320.9)
Observations	*929*	*1045*	*386*	*805*
Prob > F	*0.00*	*0.00*	*0.00*	*0.00*
R^2	*0.45*	*0.79*	*0.33*	*0.78*
JHS: Junior High School; 95% confidence intervals in brackets				
** p<0.1, ** p<0.05, *** p<0.01*				

4.4 Context analysis

In this exercise, we intend to see if there are systematic differences in price levels that could be explained by the location of the facility. We collected data on the district where each facility is located, the district's population density, the proximity of the facility to a major road, the nature of the area where the facility is located and the availability of nearby competitors. Table 5 presents bivariate regression results on the predictors of variations in MA cost from the context data. The results suggest that the variation in MA cost between the various facilities cannot be explained by the local context of the facilities.

Table 5: Bivariate regressions result of the predictors of the variations in MA cost

Variable (reference)	Estimate (95 % CI)
Facility district (Ablekuma West)	
Ashaiman	18.1 (-26.3, 62.4)
Bosomtwe	26.9 (-17.5, 71.2)
Effia-Kwesimintsim	9.3 (-26.9, 45.5)
Ga West	24.5 (-13.9, 63.0)
Kumasi Metro	16.7 (-18.4, 51.7)
La Dade-Kotopon	12.5 (-31.9, 56.8)
La Nkwantanan-Madina	2.7 (-41.6, 47.1)
New Juaben South	14.7 (-21.5, 50.9)
Sekondi-Takoradi Metro	18.3 (-16.8, 53.3)
Suhum	7.5 (-36.8, -51.9)
Population density of district (population per km^2)	0.0 (0.0, 0.0)
Facility closeness to a major road (>500 metres)	
101-500 metres	-18.5 (-55.0, 17.9)
<=100 metres	-16.7 (-43.2, 9.7)
Location of facility (Low-income area)	
Middle-income	2.5 (-11.8, 16.9)
Central business area	2.0 (-11.9, 15.9)
Close competitors (No)	
Yes	-7.6 (-18.7, 3.4)
** p<0.1, ** p<0.05, *** p<0.01*	

5. Discussion

We found that the cost of accessing MA services, estimated from the client standpoint, can vary between facilities and even within the same facility. To have a better understanding, we decomposed the variations in cost, each for clinic and pharmacy groups. We realized that the share of variations from within the pharmacies was higher, while for the clinics, the share of variations between facilities was higher. The findings suggest that MA prices remain at the discretion of the provider and/or the facility's management level. Our context analysis strengthens these findings since no context information or contextual factors considered in the study (which, of course, cover major factors) could explain the variations in cost among facilities. Due to the stigma associated with abortion access in Ghana (Rominski and Lori, 2014; Agula et al., 2021), obtaining adequate and correct information about safe methods and cost may be challenging (Moore et al., 2021). Moreover, the covert provision of MA in pharmacies and the poor regulatory framework for MA access in most clinical facilities may have created information asymmetry (Barber et al., 2019), with providers having more information on cost of the pills than their clients. With this, providers tend to overbill clients, and this could push the clients, especially those vulnerable and unable to afford higher prices, to go for methods less biomedically safe. Unfortunately, due to the design of our study, we don't know anything about women who pursue these unsafe methods of abortion.

Furthermore, findings suggest that the average cost of accessing MA in a clinical setting is almost twice as high as the cost at a pharmacy. The regression analysis, which accounted for facility fixed effect and other observable factors, confirmed that clinic clients incurred higher costs. In Ghana, elective abortions are not covered by the national health insurance scheme (Ghana Health Service, 2014) and most of the public hospitals and clinics do not stock MA pills. This gap allows health professionals in some clinics to privately purchase MA pills from either MSI Reproductive Choices or DKT International and sell them directly to clients. Clients are usually willing to accept higher prices at clinical environments because they feel that their safety is guaranteed in such facilities (Gbagbo, 2020; Klu et al., 2022).

One may argue that the higher price in clinical settings stems from value-added services such as counselling. However, it is worth indicating that guidelines from the Ghana Health Service mandate that women seeking abortion in a clinical environment, regardless of whether their health insurance is active, be provided with free sufficient information and counselling on the various abortion methods, their costs, accessibility and contraception before terminating the pregnancy (Ghana Health Service, 2014). Another argument is that the cost in clinical settings may be high because of overhead costs. However, the rationale for overhead cost is unclear since selling MA pills to clients often occurs outside the facility's management information system (MIS).

In respect to socio-demographic characteristics, our findings show that women who are not married or in union with a partner incur more cost to obtain MA, as mainly driven by pharmacy clients. Engaging in premarital sex is considered immoral behaviour in most Ghanaian communities (Hall et al., 2018). As such, some unmarried women may travel farther distances for abortion to avoid local stigma, incurring higher transportation costs. Our finding aligns with evidence from India, which suggests that unmarried women seeking abortion services are charged higher prices (Sundar, 2003). However, the context is different, and the methods used in the study on India were manual vacuum aspiration and dilation and curettage (Sundar, 2003). Additionally, a study in Kenya and India suggests that unmarried women who desire to induce abortion often have the feeling that they would be judged and prefer to keep the process a secret (Makleff et al., 2019). In keeping the process secret, these women risk missing out on important information, such as the cost of abortion service, and ultimately paying more for the service. It is important, however, to note that the construction and enactment of stigma surrounding abortion may differ from one society to another (Moore et al., 2021). Therefore, married women or women in unions may also face similar stigma related to abortion. For example, studies in Ghana and Uganda have shown that married women may also have the feeling of being judged on fidelity grounds (Mote et al., 2010; Moore et al., 2011).

We also observed that the cost of obtaining MA decreases as the number of live births increases. The women with more live births were relatively older and possibly better equipped to navigate abortion-related stigma. This may have shaped their decisions regarding where, when and from whom MA was obtained, ultimately impacting the cost. Moreover, a cross-tabulation of the

number of live births with marital status of women (the results not presented here) suggests that about 60 percent of women who are or have previously been in union had two or more live births. This indicates that the higher cost incurred by women with no or fewer live births may be impacted by their unmarried status.

Additionally, we observed that women with a higher level of education spent more to access MA services. Generally, education impacts significantly on health, including decision-making processes and choices that people make regarding their health (Zajacova and Lawrence, 2018; Raghupathi and Raghupathi, 2020). With this backdrop, we anticipated that women with higher education would have more information about MA and may be able to access MA services at relatively cheaper prices. However, it appears safety is of higher priority among educated women in their decision-making to obtain MA. About seven (7) in ten (10) women with higher education obtained MA from clinical settings, where the cost in notably higher. In support of this hypothesis, we observed that the positive relationship between education and MA cost is driven by the clinic group. For the pharmacy group, MA cost did not significantly vary by education.

Apart from socio-demographic factors, we have observed that geographic location significantly influences the cost of accessing MA. Our study found that, except Western region, the cost of MA was higher in Greater Accra, where the administrative capital of Ghana is located, compared to the other regions. This could be attributed to the high cost of living in Greater Accra (Ghana Statistical Service, 2019). One plausible reason for the high cost of MA in Western region is that most of the facilities are in Secondi/Takoradi, which receives a lot of tourists and expatriates working in mining sites in the region. The presence of these expatriates and tourists has also impacted the cost of living in Second/Takoradi.

In addition, learning about MA from the internet is associated with lower cost of MA, particularly for clinic clients. With the abundance of health information available online, these women may had obtained first-hand information that empowers them to negotiate for better prices. However, it is worth indicating that information from unreliable sources may provide misleading information on MA cost. The utilization of the internet for obtaining MA information also presents an opportunity to explore the use of mobile health (mHealth) and telemedicine in delivering abortion services in the country. Apart from providing women with accurate information, the adoption of mHealth and telemedicine has the potential to minimize the stigma women encounter in accessing abortion services.

6. Limitations of the study

This study estimated the cost of MA from the patient's perspective using both direct and indirect costs components. Specifically, both the amount women paid to obtain MA pills and the productive time lost at the facility are considered. However, there are other components of cost associated with MA, which were not considered in this study. For example, cost of transportation, loss of

productive hours of persons who accompanied women to the facility and the cost of stigma. Nevertheless, the cost components considered in this study enable a realistic comparison of findings between pharmacy and clinic clients.

It was found that the cost of abortion in countries like Zambia and Burkina Faso is associated with the household wealth index of women. Unfortunately, we could not include this variable in our analysis due to data limitations. However, with a high R squared value of over 80 percent, we are confident that we have considered the key variables that explain the variations in the cost of medical abortion.

A notable limitation of the study lies in the composition of our sample, which exclusively consists of women who opted for MA. Those who wish to have an MA, but cannot afford it, are not represented in our data. This exclusion potentially results in the underrepresentation of the most vulnerable segments of population in our study. Depending on the characteristics of these excluded women, our findings might be subject to change. However, if we include women who cannot afford MA into our sample, we expect our results to be even stronger. This is because, potentially, women who cannot afford an abortion are from more remote areas and less likely to be married and are less educated. Their inclusion could magnify socio-economic disparities in the cost of MA abortion. Given that more vulnerable groups often seek abortions in less safe environments, the need of policies, improving the access to MA becomes even more pronounced.

7. Conclusion

In conclusion, the findings of this study indicate that the cost of obtaining medication abortion varies by women's socio-demographic attributes such as their marital status, number of live births and level of education. The cost may also differ based on the type of provider, clinic or pharmacy, and the specific facility where the service is obtained. The study suggests that the discretion of providers plays a significant role in determining the prices of medication abortion pills. Furthermore, the findings show that individuals seeking medication abortion may encounter unequal access to the procedure, which could result in the use of unsafe methods by vulnerable women who are billed higher prices and are unable to afford. To reduce the disparities, it is important to develop guidelines targeting medication abortion provision and access, particularly in clinics. Educational programmes on MA access, provision and legal framework could reduce abortion-related stigma and cost variations. Programs such as telemedicine and mHealth could also help alleviate the cost disparities in accessing medication abortion services.

References

Agula, C., Henry, E. G., Asuming, P. O., Agyei-Asabere, C., Kushitor, M., Canning, D., Shah, I., & Bawah, A. A. (2021). Methods women use for induced abortion and sources of services: insights from poor urban settlements of Accra, Ghana. *BMC Women's Health, 21*(1). https://doi.org/10.1186/s12905-021-01444-9

Aniteye, P., & Mayhew, S. H. (2019). Globalisation and transitions in abortion care in Ghana. *BMC Health Services Research, 19*(1). https://doi.org/10.1186/s12913-019-4010-8

Aniteye, P., O'Brien, B., & Mayhew, S. H. (2016). Stigmatized by association: Challenges for abortion service providers in Ghana. *BMC Health Services Research*, *16*(1). https://doi.org/10.1186/s12913-016-1733-7

Arrow, K. J. (1963). Uncertainty and the welfare economics of medical care. *The American Economic Review*, *53*(5), 941–973. https://web.stanford.edu/~jay/health_class/Readings/Lecture01/arrow.pdf

Ashigbie, P. G., Azameti, D., & Wirtz, V. J. (2016). Challenges of medicines management in the public and private sector under Ghana's National Health Insurance Scheme – A qualitative study. *Journal of Pharmaceutical Policy and Practice*, *9*(1), 6. https://doi.org/10.1186/s40545-016-0055-9

Atakro, C. A., Addo, S. B., Aboagye, J. S., Menlah, A., Garti, I., Amoa-Gyarteng, K. G., Sarpong, T., Adatara, P., Kumah, K. J., Asare, B. B., Mensah, A. K., Lutterodt, S. H., & Boni, G. S. (2019). Contributing factors to unsafe abortion practices among women of reproductive age at selected district hospitals in the Ashanti region of Ghana. *BMC Women's Health*, *19*(1). https://doi.org/10.1186/s12905-019-0759-5

Atiga, O., Walters, J., & Pisa, N. (2023). Challenges of medical commodity availability in public and private health care facilities in the Upper East Region of Ghana: a patient-centered perspective. *BMC Health Services Research*, *23*(1), 719. https://doi.org/10.1186/s12913-023-09717-9

Barber, S. L., Lorenzoni, L., & Ong, P. (2019). *Price setting and price regulation in health care Lessons for advancing Universal Health Coverage*. https://www.oecd.org/health/health-systems/OECD-WHO-Price-Setting-Summary-Report.pdf

Bearak, J., Popinchalk, A., Ganatra, B., Moller, A. B., Tunçalp, Ö., Beavin, C., Kwok, L., & Alkema, L. (2020). Unintended pregnancy and abortion by income, region, and the legal status of abortion: estimates from a comprehensive model for 1990–2019. *The Lancet Global Health*, *8*(9), e1152–e1161. https://doi.org/10.1016/S2214-109X(20)30315-6

Bell, S. O., Sheehy, G., Hyacinthe, A. K., Guiella, G., & Moreau, C. (2020). Induced abortion incidence and safety in Côte d'Ivoire. *PLoS ONE*, *15*(5). https://doi.org/10.1371/journal.pone.0232364

Biggs, M. A., Brown, K., & Foster, D. G. (2020). Perceived abortion stigma and psychological well-being over five years after receiving or being denied an abortion. *PLOS ONE*, *15*(1), e0226417. https://doi.org/10.1371/journal.pone.0226417

Biney, A. A. E., & Atiglo, D. Y. (2017). Examining the association between motivations for induced abortion and method safety among women in Ghana. *Women and Health*, *57*(9), 1044–1060. https://doi.org/10.1080/03630242.2016.1235076

Boah, M., Bordotsiah, S., & Kuurdong, S. (2019). Predictors of Unsafe Induced Abortion among Women in Ghana. *Journal of Pregnancy*, *2019*. https://doi.org/10.1155/2019/9253650

Coast, E., Lattof, S. R., Rodgers, Y. V. D. M., Moore, B., & Poss, C. (2021). The microeconomics of abortion: A scoping review and analysis of the economic consequences for abortion care-seekers. *PLoS ONE*, *16*(6 June). https://doi.org/10.1371/journal.pone.0252005

Conti, J., & Cahill, E. P. (2019). Self-managed abortion. In *Current Opinion in Obstetrics and Gynecology* (Vol. 31, Issue 6, pp. 435–440). Lippincott Williams and Wilkins. https://doi.org/10.1097/GCO.0000000000000585

Ely, G. E., Hales, T., Jackson, D. L., Maguin, E., & Hamilton, G. (2017). The undue burden of paying for abortion: An exploration of abortion fund cases. *Social Work in Health Care*, *56*(2), 99–114. https://doi.org/10.1080/00981389.2016.1263270

Ganle, J. K., Busia, N. T., & Maya, E. (2019). Availability and prescription of misoprostol for medical abortion in community pharmacies and associated factors in Accra, Ghana. *International Journal of Gynecology and Obstetrics*, *144*(2), 167–173. https://doi.org/10.1002/ijgo.12717

Garrison, L. P., Pauly, M. V., Willke, R. J., & Neumann, P. J. (2018). An Overview of Value, Perspective, and Decision Context—A Health Economics Approach: An ISPOR Special Task Force Report [2]. *Value in Health*, *21*(2), 124–130. https://doi.org/10.1016/j.jval.2017.12.006

Gbagbo, F. Y. (2020). Profile of abortion seekers and their views on financial cost of induced abortions: implications for preventing unsafe abortions among young people in Accra, Ghana. *Public Health*, *183*, 112–117. https://doi.org/10.1016/j.puhe.2020.04.008

Gbagbo, F. Y., Amo-Adjei, J., & Laar, A. (2015). Gbagbo et al. Induced Abortion Decision-Making in Accra Decision-Making for Induced Abortion in the Accra Metropolis, Ghana. In *African Journal of Reproductive Health March* (Vol. 19, Issue 2).

Ghana Statistical Service. (2019). *Ghana living standards survey (GLSS) 7*. file:///C:/Users/Caesar%20Agula/Downloads/glss7-main-report_final.pdf

GSS, MoH, & ICF. (2018). *Ghana Maternal Health Survey 2017*. www.DHSprogram.com.

Hall, K. S., Manu, A., Morhe, E., Dalton, V. K., Challa, S., Loll, D., Dozier, J. L., Zochowski, M. K., Boakye, A., & Harris, L. H. (2018). Bad girl and unmet family planning need among Sub-Saharan African adolescents: the role of sexual and reproductive health stigma. *Qualitative Research in Medicine and Healthcare*, *2*(1). https://doi.org/10.4081/qrmh.2018.7062

Hlavac, M. (2014). oaxaca: Blinder-Oaxaca Decomposition in R. *Social Science Research Network*. https://doi.org/http://dx.doi.org/10.2139/ssrn.2528391

Ilboudo, P. G. C., Greco, G., Sundby, J., & Torsvik, G. (2015). Costs and consequences of abortions to women and their households: A cross-sectional study in Ouagadougou, Burkina Faso. *Health Policy and Planning*, *30*(4), 500–507. https://doi.org/10.1093/heapol/czu025

Jann, B. (2008). A Stata implementation of the Blinder-Oaxaca decomposition. In *The Stata Journal* (Vol. 8, Issue 4). www.socio.ethz.ch

Johannesson, M. (1996). *Theory and methods of economic evaluation of health care*. https://doi.org/DOI 10.1007/978-1-4757-6822-0

Johnson, D. M., Madera, M., Gomperts, R., & Aiken, A. R. A. (2021). The economic context of pursuing online medication abortion in the United States. *SSM - Qualitative Research in Health*, *1*. https://doi.org/10.1016/j.ssmqr.2021.100003

Jones, R. K., Witwer, E., & Jerman, J. (2019). *Abortion Incidence and Service Availability in the United States, 2017*. https://doi.org/10.1363/2019.30760

Kahn, J. G., Becker, B. J., Macisaa, L., Amory, J. K., Neuhaus, J., Olkin, I., & Creinin, M. D. (2000). The Efficacy of Medical Abortion: A Meta-Analysis. In *CONTRACEPTION* (Vol. 61).

Kapp, N., & Lohr, P. A. (2020). Modern methods to induce abortion: Safety, efficacy and choice. In *Best Practice and Research: Clinical Obstetrics and Gynaecology* (Vol. 63, pp. 37–44). Bailliere Tindall Ltd. https://doi.org/10.1016/j.bpobgyn.2019.11.008

Khatri, R. B., Poudel, S., & Ghimire, P. R. (2019). Factors associated with unsafe abortion practices in Nepal: Pooled analysis of the 2011 and 2016 Nepal Demographic and Health Surveys. In *PLoS ONE* (Vol. 14, Issue 10). Public Library of Science. https://doi.org/10.1371/journal.pone.0223385

Kim, D. D., Silver, M. C., Kunst, N., Cohen, J. T., Ollendorf, D. A., & Neumann, P. J. (2020). Perspective and Costing in Cost-Effectiveness Analysis, 1974–2018. *PharmacoEconomics*, *38*(10), 1135–1145. https://doi.org/10.1007/s40273-020-00942-2

Klu, D., Yeboah, I., Kayi, E. A., Okyere, J., & Essiaw, M. N. (2022). Utilization of abortion services from an unsafe provider and associated factors among women with history of induced abortion in Ghana. *BMC Pregnancy and Childbirth*, *22*(1). https://doi.org/10.1186/s12884-022-05034-x

LaRoche, K. J., & Foster, A. M. (2020). "It gives you autonomy over your own choices": A qualitative study of Canadian abortion patients' experiences with mifepristone and misoprostol. *Contraception*, *102*(1), 61–65. https://doi.org/10.1016/j.contraception.2020.04.007

Leone, T., Coast, E., Parmar, D., & Vwalika, B. (2016). The individual level cost of pregnancy termination in Zambia: a comparison of safe and unsafe abortion. *Health Policy and Planning*, *31*(7), 825–833. https://doi.org/10.1093/heapol/czv138

Lithur, N. O. (2004). Destigmatising abortion: expanding community awareness of abortion as a reproductive health issue in Ghana. *African Journal of Reproductive Health*, *8*(1), 70–74.

Liu, Z. (2024). The inequality of healthcare between urban and rural areas in China in recent ten years. In *Addressing Global Challenges - Exploring Socio-Cultural Dynamics and Sustainable Solutions in a Changing World* (pp. 142–148). Routledge. https://doi.org/10.1201/9781032676043-20

Makleff, S., Wilkins, R., Wachsmann, H., Gupta, D., Wachira, M., Bunde, W., Radhakrishnan, U., Cislaghi, B., & Baum, S. E. (2019). Exploring stigma and social norms in women's abortion experiences and their expectations of care. *Sexual and Reproductive Health Matters*, *27*(3). https://doi.org/10.1080/26410397.2019.1661753

Mishra, A., & Pandey, N. (2023). Pricing information asymmetry in healthcare: stakeholder analysis and research insights. *International Journal of Pharmaceutical and Healthcare Marketing*, *17*(4), 539–563. https://doi.org/10.1108/IJPHM-01-2023-0010

Moore, A., Jagwe-Wadda, G., & Bankole, A. (2011). Men's attitudes about abortion in uganda. *Journal of Biosocial Science*, *43*(1), 31–45. https://doi.org/10.1017/S0021932010000507

Moore, B., Poss, C., Coast, E., Lattof, S. R., & van derMeulen Rodgers, Y. (2021). The economics of abortion and its links with stigma: A secondary analysis from a scoping review on the economics of abortion. In *PLoS ONE* (Vol. 16, Issue 2 Febuary). Public Library of Science. https://doi.org/10.1371/journal.pone.0246238

Mote, C. V, Larsen-Reindorf, R., Otupiri, E., & Hindin, M. (2010). Factors associated with induced abortion among women in Hohoe, Ghana. *African Joornal of Reproductive Health*, *14*(4), 115–121. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4181373/pdf/nihms630328.pdf

Murthy, A., & Creinin, M. D. (2005). Pharmacoeconomics of medical abortion: a review of cost in the United States, Europe and Asia 504. *Expert Opinion on Pharmacotherapy*, *4*(4), 503–513. https://doi.org/https://doi.org/10.1517/14656566.4.4.503

Otsin, M. N. A., Black, K., Hooker, L., & Taft, A. J. (2023). Pharmacy dispensing of abortion pills in Ghana: experiences of pharmacy workers and users. *BMJ Sexual & Reproductive Health*, bmjsrh-2022-201674. https://doi.org/10.1136/bmjsrh-2022-201674

Payne, C. M., Debbink, M. P., Steele, E. A., Buck, C. T., Martin, L. A., Hassinger, J. A., & Harris, L. H. (2013). Why women are dying from unsafe abortion: narratives of Ghanaian abortion providers. *African Journal of Reproductive Health*, *17*(2), 118–128.

Raghupathi, V., & Raghupathi, W. (2020). The influence of education on health: An empirical assessment of OECD countries for the period 1995-2015. *Archives of Public Health*, *78*(1). https://doi.org/10.1186/s13690-020-00402-5

Rahimi, E., & Hashemi Nazari, S. S. (2021). A detailed explanation and graphical representation of the Blinder-Oaxaca decomposition method with its application in health inequalities. *Emerging Themes in Epidemiology*, *18*(1). https://doi.org/10.1186/s12982-021-00100-9

Roberts, S. C. M., Gould, H., Kimport, K., Weitz, T. A., & Foster, D. G. (2014). Out-of-Pocket Costs and Insurance Coverage for Abortion in the United States. *Women's Health Issues*, *24*(2), e211–e218. https://doi.org/10.1016/j.whi.2014.01.003

Rominski, S. D., & Lori, J. R. (2014). Abortion Care in Ghana: A Critical Review of the Literature. In *African Journal of Reproductive Health* (Vol. 18, Issue 3).

Sundar, R. (2003). *Abortion costs and financing: a review*. https://www.semanticscholar.org/paper/ABORTION-COSTS-AND-FINANCING-A-REVIEW-Sundar/afec8ca5011d98969010efabd06c4ae4ab290c41

Walker, J. (2019). Non-inferiority statistics and equivalence studies. In *BJA Education* (Vol. 19, Issue 8, pp. 267–271). Elsevier Ltd. https://doi.org/10.1016/j.bjae.2019.03.004

WHO. (2012). *Safe abortion : technical and policy guidance for health systems*. https://www.ncbi.nlm.nih.gov/books/NBK138196/

WHO. (2022). *Abortion care guideline*. https://www.who.int/publications/i/item/9789240039483

Zajacova, A., & Lawrence, E. M. (2018). The Relationship between Education and Health: Reducing Disparities Through a Contextual Approach. In *Annual Review of Public Health* (Vol. 39, pp. 273–289). Annual Reviews Inc. https://doi.org/10.1146/annurev-publhealth-031816-044628

Zimmerman, E., & Woolf, S. H. (2014). Understanding the Relationship Between Education and Health. *NAM Perspectives*, *4*(6). https://doi.org/10.31478/201406a

Appendix 1

The Blinder-Oaxaca regression decomposition offers insights into understanding the difference in the means of an outcome variable (in this study, cost of medication abortion) between two groups (pharmacy versus clinic-based facilities)(Jann, 2008). The regression decomposes the difference into: 1. the portion that is explained by the differences in the levels of the independent variables and 2. the portion that cannot be explained by the differences in the explanatory variables (Hlavac, 2014).

Given that,

$$Y = Cost\ of\ medication\ abortion$$
$$P = Pharmacy$$
$$C = Clinic - based$$
$$X = women's\ characteristics$$

Hlavac (2014) shows that the mean difference in cost of medication abortion for the two groups can be written as:

$$\Delta\bar{Y} = \bar{Y}_P - \bar{Y}_C \quad (1)$$

However, based on a linear model, $\Delta\bar{Y}$ can also be written as:

$$\Delta\bar{Y} = \bar{X}_P'\hat{\beta}_P - \bar{X}_C'\hat{\beta}_C \quad (2)$$

where, X is a vector that contains the mean values of the explanatory variables while $\hat{\beta}$ contains the coefficients of the regression.

Based on equation (2), the twofold decomposition can be specified as:

$$\Delta\bar{Y} = \underbrace{(\bar{X}_P - \bar{X}_C)'\beta^*}_{\text{Explained portion}} + \underbrace{\bar{X}_P'\left(\hat{\beta}_P - \beta^*\right) + \bar{X}_C'\left(\beta^* - \hat{\beta}_C\right)}_{\text{Unexplained portion}} \quad (3)$$

Where, β^* is a non-discriminatory coefficient.

Appendix 2
Blinder-Oaxaca decomposition regression output

```
. do "C:\Users\CAESAR~1\AppData\Local\Temp\STD61a0_000000.tmp"

. oaxaca t_cost greater_than_24 never parity no_educ basic secondary service skilled unskil
> led student unemployed town village ashanti eastern western C2 C3 C4 C5 C6 C7 C8 C9 C10 P
> 1 P2 /*P3*/ P4 P5 /*P6*/ P7 /*P8*/ P9 P10 P11 /*P12*/ friend family internet MA surgical,
>  by(clinic) pooled relax
(model 1 has zero variance coefficients)
(model 2 has zero variance coefficients)

Blinder-Oaxaca decomposition                          Number of obs = 1,974
                                              Model             =     linear
Group 1: clinic = 0                           N of obs 1        =        929
Group 2: clinic = 1                           N of obs 2        =      1,045

    explained: (X1 - X2) * b
  unexplained: X1 * (b1 - b) + X2 * (b - b2)
               with b from pooled model (including group dummy)
```

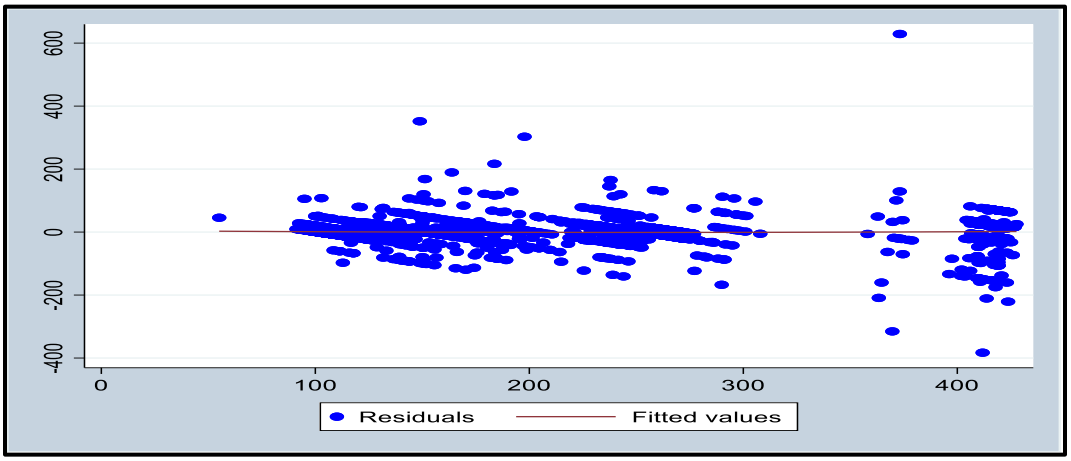
t_cost	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
overall						
group_1	138.8768	1.468923	94.54	0.000	135.9978	141.7558
group_2	264.2438	3.271385	80.77	0.000	257.832	270.6556
difference	-125.367	3.586042	-34.96	0.000	-132.3955	-118.3385
explained	-19.85819	16.1527	-1.23	0.219	-51.5169	11.80053
unexplained	-105.5088	16.34803	-6.45	0.000	-137.5503	-73.46724
explained						
greater_than_24	-.0273612	.1365661	-0.20	0.841	-.2950258	.2403034
never	-.2617746	.1590242	-1.65	0.100	-.5734563	.0499072
parity	-.3184916	.1869328	-1.70	0.088	-.6848732	.0478899
no_educ	.0607237	.0996097	0.61	0.542	-.1345077	.255955
basic	-.9021301	.4416503	-2.04	0.041	-1.767749	-.0365113
secondary	-.2257412	.2508826	-0.90	0.368	-.717462	.2659797
service	-.1864412	.2976582	-0.63	0.531	-.7698406	.3969582
skilled	-.0226559	.052851	-0.43	0.668	-.126242	.0809302
unskilled	-.106915	.2518347	-0.42	0.671	-.600502	.386672
student	.1906806	.1702206	1.12	0.263	-.1429457	.5243069
unemployed	.0571659	.0747772	0.76	0.445	-.0893947	.2037264
town	-1.292184	.4352288	-2.97	0.003	-2.145217	-.4391511
village	.0359112	.0881652	0.41	0.684	-.1368895	.2087119
ashanti	.563759	1.120102	0.50	0.615	-1.631601	2.759119
eastern	-9.913575	2.432866	-4.07	0.000	-14.6819	-5.145246
western	-1.966481	1.04308	-1.89	0.059	-4.010881	.0779178
C2	4.336608	1.146306	3.78	0.000	2.089889	6.583326
C3	3.742988	1.904504	1.97	0.049	.0102288	7.475748
C4	-37.75468	4.249765	-8.88	0.000	-46.08407	-29.4253
C5	-2.488756	.9810009	-2.54	0.011	-4.411483	-.5660301
C6	12.24909	2.458583	4.98	0.000	7.430356	17.06782
C7	1.21045	.8542317	1.42	0.156	-.4638134	2.884713
C8	20.61244	4.315292	4.78	0.000	12.15462	29.07026
C9	5.002176	1.042396	4.80	0.000	2.959118	7.045233
C10	5.830075	1.184062	4.92	0.000	3.509356	8.150794
P1	-.7108489	.4234405	-1.68	0.093	-1.540777	.1190792
P2	-3.55411	1.940643	-1.83	0.067	-7.3577	.2494806
P4	.8999373	.3784083	2.38	0.017	.1582707	1.641604
P5	2.821018	.6000037	4.70	0.000	1.645033	3.997004
P7	-3.413068	1.415567	-2.41	0.016	-6.187528	-.6386084
P9	-7.605408	1.167575	-6.51	0.000	-9.893813	-5.317003
P10	-4.491552	.7219516	-6.22	0.000	-5.906551	-3.076553
P11	-3.05941	.6185302	-4.95	0.000	-4.271707	-1.847113
friend	-.0179437	.1729254	-0.10	0.917	-.3568712	.3209839
family	-.1371782	.3511039	-0.39	0.696	-.8253291	.5509727
internet	.8633161	.3596183	2.40	0.016	.1584773	1.568155
MA	.1216338	.313091	0.39	0.698	-.4920133	.7352808
surgical	.0005543	.0078725	0.07	0.944	-.0148754	.0159841

unexplained						
greater_than_24	-1.299927	2.676859	-0.49	0.627	-6.546474	3.94662
never	6.239065	3.229448	1.93	0.053	-.0905371	12.56867
parity	2.514667	1.093478	2.30	0.021	.3714896	4.657844
no_educ	.4850085	.3821562	1.27	0.204	-.2640038	1.234021
basic	3.072428	1.812769	1.69	0.090	-.4805341	6.625389
secondary	.4290979	2.007855	0.21	0.831	-3.506226	4.364422
service	1.386343	1.752627	0.79	0.429	-2.048744	4.821429
skilled	1.411958	.9719752	1.45	0.146	-.4930784	3.316994
unskilled	-.7389764	1.352833	-0.55	0.585	-3.39048	1.912527
student	.8219703	1.231522	0.67	0.504	-1.591769	3.235709
unemployed	1.04462	.8023895	1.30	0.193	-.5280342	2.617275
town	-9.087071	3.57762	-2.54	0.011	-16.09908	-2.075064
village	.1166616	.5396922	0.22	0.829	-.9411157	1.174439
ashanti	-39.66404	4.629825	-8.57	0.000	-48.73833	-30.58975
eastern	16.08233	3.356768	4.79	0.000	9.503191	22.66148
western	66.45494	6.130791	10.84	0.000	54.43881	78.47107
C2	.012821	.230715	0.06	0.956	-.439372	.465014
C3	-.0482249	.5719285	-0.08	0.933	-1.169184	1.072734
C4	37.75468	4.249765	8.88	0.000	29.4253	46.08407
C5	3.273752	.8093465	4.04	0.000	1.687462	4.860042
C6	-12.24909	2.458583	-4.98	0.000	-17.06782	-7.430356
C7	-4.295907	1.0075	-4.26	0.000	-6.27057	-2.321244
C8	-52.16234	5.1084	-10.21	0.000	-62.17462	-42.15006
C9	-6.623001	1.273036	-5.20	0.000	-9.118106	-4.127895
C10	-5.830075	1.184062	-4.92	0.000	-8.150794	-3.509356
P1	.0096881	.0577377	0.17	0.867	-.1034757	.122852
P2	-1.079647	.4744837	-2.28	0.023	-2.009618	-.1496759
P4	-.1399502	.1588823	-0.88	0.378	-.4513537	.1714534
P5	.0575835	.0848946	0.68	0.498	-.1088069	.2239739
P7	-.2066983	.3668906	-0.56	0.573	-.9257906	.512394
P9	-.2958176	.1696275	-1.74	0.081	-.6282813	.0366461
P10	-.1390012	.0903342	-1.54	0.124	-.316053	.0380506
P11	-.0534018	.1058237	-0.50	0.614	-.2608125	.1540089
friend	3.57764	2.652219	1.35	0.177	-1.620614	8.775893
family	1.711899	.9854467	1.74	0.082	-.2195407	3.64334
internet	2.597177	1.032736	2.51	0.012	.5730514	4.621303
MA	-1.346521	1.343425	-1.00	0.316	-3.979586	1.286545
surgical	.0438677	.5171652	0.08	0.932	-.9697576	1.057493
_cons	-119.3473	19.33984	-6.17	0.000	-157.2527	-81.44192

```
. *NB: P3, P6, P8 and P12 were omitted in the initial regression because of collinearity
.
end of do-file
```

Appendix 3

Residuals versus fitted values plot



The residuals are evenly and randomly distributed above and below the regression line.

Variance Inflation Factor for the independent variables

```
. do "C:\Users\CAESAR~1\AppData\Local\Temp\STD2b38_000000.tmp"

. vif

    Variable |       VIF       1/VIF
-------------+----------------------
      2.age2 |      1.52    0.658394
  2.marital2 |      1.30    0.771440
      parity |      1.14    0.877628
       educ4 |
          1  |      1.19    0.840220
          2  |      2.54    0.394371
          3  |      2.10    0.475276
employment6  |
          2  |      2.68    0.373828
          3  |      1.76    0.567082
          4  |      2.01    0.497661
          5  |      2.07    0.483293
          6  |      1.80    0.556610
  residence  |
          2  |      1.49    0.670451
          3  |      1.18    0.847760
     region  |
          1  |     21.79    0.045895
          2  |     20.87    0.047922
          4  |     26.87    0.037217
1.facility   |     31.34    0.031913
facility22   |
          2  |      3.34    0.299723
          3  |      5.90    0.169392
          4  |     18.69    0.053503
          5  |      2.72    0.368181
          6  |     11.54    0.086656
          7  |      4.96    0.201650
          8  |     21.87    0.045718
          9  |      3.99    0.250841
         10  |      3.63    0.275746
         11  |      1.96    0.509867
         12  |      6.04    0.165460
         14  |      3.86    0.259348
         15  |      2.34    0.427497
         17  |      5.26    0.190152
         19  |      3.79    0.263611
         20  |      2.37    0.421552
         21  |      2.72    0.367119
1.learnedM~d |      1.39    0.717702
1.learnedM~e |      1.22    0.819907
1.learned~et |      1.64    0.610511
pre_aborti~d |
          1  |      1.18    0.848099
          2  |      1.10    0.908311
-------------+----------------------
    Mean VIF |      6.03

.
end of do-file
```