Stavropoulou, C., Parmar, D. & Ioannidis, J. P. A. (2016). Research authors' reply to Barlow and Barr and Taylor-Robinson. BMJ, 355, i6639. doi: 10.1136/bmj.i6639

CITY UNIVERSITY LONDON

EST 1894

City Research Online

Original citation: Stavropoulou, C., Parmar, D. & Ioannidis, J. P. A. (2016). Research authors' reply to Barlow and Barr and Taylor-Robinson. BMJ, 355, i6639. doi: 10.1136/bmj.i6639

Permanent City Research Online URL: http://openaccess.city.ac.uk/16525/

The individual level cost of pregnancy termination in Zambia: a comparison of safe and unsafe abortion

Tiziana Leone* (1), Ernestina Coast (1), Divya Parmar (2), Bellington Vwalika (3)

(1) Dept. of Social Policy, London School of Economics, WC2A 2AE, UK

(2) School of Health Sciences, City University London, EC1V 0HB, UK

(3) Dept. of Obstetrics & Gynaecology, University Teaching Hospital, Lusaka, Zambia

* Corresponding author: Tiziana Leone (t.leone@lse.ac.uk)

Abstract

Zambia has one of the most liberal abortion laws in sub-Saharan Africa. However, rates of unsafe abortion remain high with negative health and economic consequences. Little is known about the economic burden on women of abortion care-seeking in low income countries. The majority of studies focus on direct costs (e.g.: hospital fees). This paper estimates the individual-level economic burden of safe and unsafe abortion care-seeking in Zambia, incorporating all indirect and direct costs. It uses data collected in 2013 from a tertiary hospital in Lusaka, (n=112) with women who had an abortion. Three treatment routes are identified: i) safe abortion at the hospital ii) unsafe clandestine medical abortion initiated elsewhere with post-abortion care at the hospital and iii) unsafe abortion initiated elsewhere with post-abortion care at the hospital. Based on these three typologies, we use descriptive analysis and linear regression to estimate the costs for women of seeking safe and unsafe abortion and to establish whether the burden of abortion care-seeking costs is equally distributed across the sample.

Around 39% of women had an unsafe abortion, incurring substantial economic costs before seeking post-abortion care. Adolescents and poorer women are more likely to use unsafe abortion. Unsafe abortion requiring post-abortion care costs women 27% more than a safe abortion. When accounting for uncertainty this figure increases dramatically. For safe and unsafe abortions, unofficial provider payments represent a major cost to women.

This study demonstrates that despite a liberal legislation, Zambia still needs better dissemination of the law to women and providers and resources to ensure abortion service access. The policy implications of this study include: the role of pharmacists and mid-level providers in the provision of medical abortion services; increased access to contraception, especially for adolescents; and, elimination of demands for unofficial provider payments.

Keywords: Abortion, Africa, Direct costs, Indirect costs, Zambia

Introduction

In Africa, it is estimated that 13% of all pregnancies end in induced abortion, of which 97% are unsafe (Sedgh, Singh et al. 2012). In 2008 over 90% of African women of reproductive age lived in a country with restrictive abortion laws (Guttmacher Institute 2012). Zambia has one of the most liberal abortion laws in sub-Saharan Africa, with abortion permitted on a wide range of grounds (GRZ 1972). However, this does not guarantee the safety of abortions (Sedgh, Singh et al. 2012).

The World Health Organization (WHO) established a definition of unsafe abortion as a procedure for termination of an unintended pregnancy done either by a person lacking the necessary skills or in an environment that does not conform to minimum medical standards, or both (WHO 1993). However, this binary categorisation of safe/unsafe incorporates a continuum of risks reflecting abortion method, provider training, gestational age, legal context, and level of abortion stigma (for both women and providers) (Sedgh, Singh et al. 2012; Ganatra, Tunçalp et al. 2014). Globally, the availability and use of medical abortion (misoprostol or misoprostol and mifepristone) is increasing. Clandestine medical abortions carry risks and complications (e.g.: incomplete abortion, prolonged and heavy bleeding). The costs of providing abortion-related care – whether for a safe abortion or post-abortion care following an unsafe abortion – impact at both macro (e.g.: health system) and micro (e.g.: individual, household) levels.

The costs of unsafe abortion for health systems in low income settings are substantial (Konje, Obisesan et al. 1992; Vlassoff, Shearer et al. 2008; Levin, Grossman et al. 2009; Vlassoff, Walker et al. 2009; Vlassoff, Mugisha et al. 2012; Vlassoff, Furere et al. 2013; Vlassoff, Musange et al. 2014). In Zambia it is estimated that substantial savings could be made by the health system if unsafe abortions requiring post-abortion care (PAC) had instead been treated with safe abortion (Parmar, Leone et al. 2014). However, very little is known about the individual-level economic impact of procuring an abortion, or seeking care following an unsafe abortion, especially in Africa.

A review of 28 studies on post-abortion care costs in Africa concluded that studies that addressed indirect costs (e.g.: loss of productivity) were "conspicuous by their absence" (Woog, Singh et al. 2007 p.58). Most research focuses on out-of-pocket expenses that women incur for abortion complications. A Nigerian study of the direct costs for women treated for complications of unsafe abortion estimated that nearly three quarters of costs were shouldered by the woman and/or her household (Bankole, Singh et al. 2007). A study from Uganda using Monte Carlo simulation methods estimated high direct costs for abortion-related care at US$62 per abortion (Babigumira, Stergachis et al. 2011). A study from Burkina Faso (Ilboudo, Greco et al. 2015) found the cost of induced abortion was considerably higher than spontaneous abortion, and this study did not account for any costs incurred by women prior to hospitalisation.

Most studies do not consider the wider economic impact of abortion care-seeking, such as opportunity costs (e.g.: foregone work or education), and few include costs incurred throughout the care-seeking process beyond what is paid in hospital. Two Asian studies considered women's loss of time and income (Narkavonnakit and Bennett 1981; Potdar, Fetters et al. 2008). Both found substantial losses for the women and their households. A

study from Mozambique found the costs (treatment and opportunity costs) of safe abortion were considerably higher than post-abortion care following unsafe abortion because of high hospital fees for safe abortion, which also acted as an incentive to seek unsafe abortion (Machungo, Zanconato et al. 1997). Finally, Sundaram et al.'s comprehensive study of the costs of abortion care-seeking in Uganda calculated the impact of associated expenses and on the productivity of women and other family members; and, households' economic responses to the consequences of unsafe abortion (e.g.: sales of assets) (Sundaram, Vlassoff et al. 2013). They found that three quarters of women suffered loss of productivity, and over a third experienced deterioration in their economic circumstances.

We know relatively little globally about the individual-level economic burden of seeking and procuring abortion, especially in Africa. Nothing is known about these costs in Zambia. Costs for individuals and their families/households do not start at point of treatment: costs are incurred directly and indirectly throughout the treatment pathway (e.g.: transport, food, accommodation, loss of income) (T-T Edejer, Tessa et al. 2004). Further, costs borne by the poorest women, with least access to contraception and fewest resources, are especially important, though infrequently considered (Guttmacher Institute 2012).

We present evidence on the direct and indirect costs of abortion care-seeking from the time that a woman decided to seek an abortion to receipt of safe abortion or post-abortion care. We compare the costs of post-abortion care following unsafe abortion with costs of safe abortion care. This is the first detailed investigation into individual costs of abortion in Zambia, and one of very few studies globally to consider the wealth of women seeking abortion care.

Context

In Zambia, induced abortion is legal if: continuing a pregnancy involves a risk to the life of the pregnant woman, her physical or mental health or that of any of her existing children, greater than if the pregnancy were terminated; a child born of the pregnancy would suffer from physical or mental abnormalities as to be seriously handicapped(GRZ 1972); or the woman was raped (GRZ 2009). Medication abortion (MA) is permitted for gestational age 5-9 weeks (and up to 12 weeks under certain circumstances) and manual vacuum aspiration (MVA) for 5-12 weeks (and up to 15 weeks under certain circumstances) (GRZ 2009).

Despite this legal provision for safe abortion in Zambia, a significant proportion of abortions (70%) are estimated to be unsafe (Likwa, Biddlecom et al. 2009), reflecting low levels of knowledge of the law and protocols by the population and health professionals alike (Macha, Muyuni et al. 2014) and high levels of stigma for both those that provide and those that seek abortion (Geary, Gebreselassie et al. 2012). In 2013/14 Zambia had a maternal mortality ratio of 398 maternal deaths per 100,000 live births (CSO, MOH et al. 2014). Although there are no nationally aggregated data on induced abortion incidence, whether safe or unsafe (Macha, Muyuni et al. 2014), the Zambian Government estimate that 30 percent of maternal mortality is attributable to unsafe abortion (MoH 2009).

Whilst knowledge about contraception is near-universal in Zambia, unmet need for contraception is high: 27% of married women report wanting to delay or stop childbearing but not using any contraception (Measure DHS 2013). Given high rates of unintended pregnancies (37%) and unmet need for contraception, poorer and younger women are likely

to seek unsafe, clandestine terminations (Warenius, Faxelid et al. 2006; Chisha 2014). Often this is due to limited awareness of how to obtain a safe, legal abortion (Koster-Oyekan 1998; Coast 2014).

Safe abortion services are, theoretically, available at a wide range of GoZ health facilities, from tertiary hospitals to District hospitals, although the actual number of sites providing safe abortion services is unknown. In addition to government providers, safe abortion services are provided by a limited number of non-governmental organisations, mainly in urban Zambia (MSZ 2015; PPAZ 2015). Some private medical practices are registered (regulated by the Health Professions Council of Zambia) to provide safe abortion services, but the number of these and of the abortions they provide is unknown. Some pharmacists in Zambia have been trained to provide referral information to women seeking safe abortion services (Fetters, Raisanen et al. 2015; Hendrickson, Fetters et al. 2015). In 2012, the medical abortion combination pack Medabon® (mifepristone and misoprostol) was approved for use in Zambia by the Ministry of Health. Medical abortion drugs are widely available to purchase in Lusaka (Likwa, Biddlecom et al. 2009 citing GoZ, 2008).

There are few medical practitioners to provide safe abortions legally. In 2014, less than 1,000 registered doctors served Zambia's population of almost 14 million, of which fewer than 60 were obstetrician/gynaecologists (ZAGO 2014). The majority of doctors are concentrated in urban areas, while 60% of Zambians live in rural areas (CSO 2012). The low numbers, and urban concentration, of health professionals act as a barrier to the provision of safe abortion services. At Lusaka's University Teaching Hospital (UTH) staff have been trained on the legality and importance of access to safe abortion. Between 2009 and 2011, over 5,000 women were admitted annually with an incomplete abortion or to request a safe termination. While the total number of cases did not change year on year, the proportion of safe, legal pregnancy terminations increased: from 3.2% in 2009 to 7.7% in 2011 (Macha et al., 2014). At UTH, SA and PAC services are free, following the payment of a registration fee. The level of the registration fee depends on whether a woman has been referred to UTH from another clinic ($1.83), or has sought care directly at UTH ($14.64). This differential registration fee is a policy to incentivise women to seek care locally in the first instance.

Whilst not allowed, unofficial payments are frequently demanded (and paid) across the health sector in Zambia (García-Prado and González 2007; McCoy, Bennett et al. 2008), elsewhere in Africa (Kruk, Mbaruku et al. 2008) and globally (Hodorogea and Comendant 2010).

Data and methods

The study used hospital-based recruitment at University Teaching Hospital (UTH) in Lusaka at varying times in the day over a 12 month period (January-December 2013), of adolescents and women (N=112) identified as having received a safe abortion (SA) or PAC. Potential respondents were identified by nurses and invited to participate once ready for discharge. Our sample included women treated as out-patients (either PAC or SA) and those hospitalised for severe post-abortion complications (29%). Women who received PAC following a spontaneous abortion (miscarriage) were not included in this study. The hospital has a two tier system of care: standard and 'high cost', for wealthier patients or those with health insurance. The majority (89%) of our sample were from the standard system.

Interviews were conducted in a private office close to the treatment ward by female research assistants fluent in all major Zambian languages and English. Multiple strategies were used in order to increase the likelihood that women would report that they had had an induced abortion, including: initial introduction of the research project was done by a project-trained nurse involved in SA and PAC care, and reassurance that the interview would be confidential and anonymous. Research assistants were trained by the research team in ethics, informed consent and interviewing. A copy of the research instrument is available[1]. A novel two interviewer approach was used: one research assistant conducted the interview in a conversational style in order to put the participant at ease and to facilitate interview flow by maintaining eye contact, whilst a second research assistant completed the quantitative part of the data instrument. Towards the end of the interview the second research assistant asked supplementary questions not covered by the first research assistant in order to ensure item completeness. This technique has been used by two authors (EC, TL) in an unrelated research project[2]. The nature of the interview meant that both quantitative and qualitative data were collected simultaneously, allowing the research assistants to probe responses further than a quantitative survey. Although respondents were not asked how they felt about the two interviewer approach, in our opinion and based on detailed debriefs with the research assistants, there were no drawbacks to using this approach. Separate consent was sought from respondents to access their medical records.

The sample size represents a compromise between attaining statistical significance and the logistics of fieldwork. It was mainly driven by quantitative needs above qualitative. It was calculated based on current estimates of abortion rates in the hospital for a 95% confidence level and a 5% error margin of the estimates obtained given a response level of 80%. This is line with standard practice when calculating sample size in order to achieve enough statistical power in the estimates obtained (Lachin 1981). Women who declined to participate (13%) cited being uncomfortable discussing their experience or needing to leave the hospital quickly to return to their children. Item non-response was very low and not clustered around any specific item.

Women were asked to recall all of the direct and indirect costs incurred from the time of decision to terminate the pregnancy, both safe and unsafe, and including multiple attempts. Information reported by women about treatment costs were triangulated with two sources during analyses: women's medical records were reviewed, and data extracted by a team member with clinical expertise (BV); and, key informant interviews (n=18) were

---

[1] http://www.abortionresearchconsortium.org/extra/Zambia-Data-Sheet.pdf
[2] http://www.householdsurvey.info/methods-and-data-comparative

conducted (January 2013-January 2014) with purposively sampled service providers (doctors, nurses, pharmacists) from a range of settings (UTH, district clinics), health service administrators (UTH and MOH), and staff of NGOs active in the provision and funding of safe abortion and PAC services in Zambia. This paper presents costs incurred by women who sought abortion-related care. Direct and indirect costs throughout the process from the decision to seek an abortion, to the attempt(s) to terminate, and until hospital discharge are included. Data come from quantitative and qualitative elements of the interviews and respondents' medical records, which included referral notes from district clinics for some cases. These were very useful in triangulating the information given by the woman and in assessing the seriousness of the case. Qualitative information contributes to a much richer understanding of the multiple treatment routes taken by some women, leading to higher quality quantitative costing data.

Data generated includes women's socio-demographic background, direct service costs (e.g.: costs for consultations, fees for diagnostic tests and medicines), indirect costs (e.g.: unofficial provider payments, lodging for carers and the woman, missed work/school days, missed housework, wage loss for both the woman and carer who accompanied her to the hospital/health centre, childcare costs, transport, accommodation and food purchased), resources used to pay for these costs (e.g.: credit, asset sale, borrowing), and household assets ownership. A wealth asset was calculated using principle components analysis with assets weighted according to the overall population distribution (Filmer and Pritchett 2001).

Our approach to costing analyses is a mixture of individual and household perspectives (DeWitt, Grussemeyer et al. 2012). We base our costing framework on the WHO-CHOICE cost-effectiveness approach (WHO). Some women make multiple attempts to terminate a pregnancy, often escalating the method (e.g.: overdose of contraceptive pills followed by insertion of a foreign object). We collected data on all attempts in order to more accurately reflect the total costs incurred. Opportunity costs were calculated for missed housework by applying a minimum salary rate of KW3.65 ($0.67) per hour imputed using national figures in order to produce a range of estimates for women engaged in domestic work (GRZ 2012) missed schooldays were imputed for students and costed at minimum wage for those accompanying the student (Kik, Olthof et al. 2009).

Finally, we consider the determinants of the total costs of abortion care-seeking by running a linear regression of the costs by treatment route, controlling for socio-demographic characteristics. The regression analysis considers whether the burden of costs is equally distributed across socio-economic groups.

Descriptive results

Women interviewed (N=112) were aged between 14 and 43 years with a mean age of 25.6 years (Table 1). More than 80% live in Lusaka and 29.8% are still at school. Just over one third (35%) are married or currently living with a partner; 42% of the sample were childless but nearly a third (31%) had two children or more. Just over half (53%) of the sample reported using contraception at the time they became pregnant, of which male condoms (41%) and oral contraceptives (21%) accounted for the majority of contraceptive use; withdrawal was reported by 12% of respondents. Our sample is younger and has lower parity than the national population (CSO, MOH et al. 2014).

The collection of data on detailed treatment routes, recording every single step in a woman's trajectory to seeking either a SA or PAC, including who else was involved (friend, relative, healthcare professional, etc.), and how (advice, material support, etc.), allows us to identify three groups of women: i) those who had a safe abortion (SA) at UTH ii) those who sought medical abortion from elsewhere (e.g. from a pharmacist) and subsequently sought PAC at UTH and, iii) those who initiated a non-medical abortion (e.g.: painkiller overdose, insertion of a foreign object) and subsequently sought PAC at UTH. Both categories ii) and iii) are unsafe abortions using the WHO definition. However, because the risk of different methods varies (Ganatra, Tunçalp et al. 2014), we have disaggregated them in some of our analyses. Our hospital-based sample excludes women who had an unsafe abortion with no complications, women who sought non-hospital based PAC, women who died as a result of unsafe abortion complications, and women who sought safe abortion in private healthcare facilities. We acknowledge this as a limitation but it was beyond the reach of the study to include them.

Our sample includes a wide range of experiences, from women who made multiple attempts to have an unsafe abortion and then subsequently sought PAC at UTH, to women who were able to access information about safe abortion services (Coast and Murray 2014). The majority of our sample (60.9%), which reflects our hospital-based recruitment strategy, sought a safe abortion at UTH, with some women coming directly and others referred by a district clinic. Direct care-seeking at UTH involved the payment of a $14.64 registration fee, a policy to encourage the use of district hospitals. For those women that came directly to UTH rather than seeking care nearer home, a range of reasons were given, including the anonymity of the large tertiary hospital, perceptions that UTH would be better able to deal with any complications following the abortion, and perceptions of the high quality of medical care at UTH, despite long waiting times. UTH registration fee was reduced to $1.83 for women referred from a district clinic. Our data suggest that poorer women who were aware of this registration fee reduction sought a referral first despite the delay it inevitably introduced in procuring a safe abortion.

Despite the legal status of abortion, and our study site of Zambia's capital, Lusaka – where potential sources of information about the law and abortion services are highest for Zambia – a substantial minority (39.1%) of women sought an unsafe abortion and subsequently post-abortion care. Of these women, 32.6% initiated an abortion unsafely using medical abortion and 67.4% initiated an abortion using another method.

Younger women and adolescents reported seeking abortion because of concerns about education completion (school and university) (22.3%). The stigma associated with a non-marital pregnancy was a key factor for some women (17%). Reasons related to the cost of a(nother) child and the number of existing children often merged as women gave their reasons, in some cases because the husband was not supporting existing children. A significant minority of women (7.4%) ended their pregnancy because it was too close to a previous birth, highlighting problems in access to or provision of post-partum contraception; some women reported having been refused contraception because they were still amenorrheic following their last birth.

Across the three trajectories to abortion care (safe abortion, PAC following a medical abortion initiated elsewhere, PAC following non-medical abortion initiated elsewhere), women seeking safe abortion (SA) at UTH were older than those seeking PAC (Figure 1).

Women seeking SA at UTH have a higher level of education followed by those who sought unsafe medical abortion and subsequent PAC. Women seeking SA at UTH were generally wealthier than women seeking PAC after an unsafe abortion (Figure 2).

Around 16% of the sample missed school in order to obtain an abortion (including before arriving at UTH), with most (13.4%) missing 1-2 days and others less. Most women (70%) reported that someone (mother, husband, boyfriend) helped them to seek care at UTH and half of the sample (50.4%) reported that this help was financial (e.g. money for transport, fees, unofficial payments). However, a substantial minority of women (30%) did not receive help from anyone, often because it was impossible for them to reveal that they were seeking, or had, an abortion.

We considered women and their household's financial (e.g.: having to find someone to cover work, or selling assets) coping mechanism in response to care seeking. However few women discussed these, possibly because the average duration of the stay was 3.5 hours for SA vs 4.5 for PAC and if they stayed overnight the average number of nights was 0.77 (0.68 for SA vs 0.88 for PAC) which meant they could get on with their life more easily (e.g.: less need to look for extra childcare). On average, women missed around 2.2 days of either school or work (2 for SA vs 4.8 for PAC) which includes time to get to and from UTH and time spent at UTH as well as time spent ill due to an unsafe abortion.

Costs analysis

We present data on components of costs by the three treatment routes (Table 2). Miscellaneous indirect costs include items such as transport, meals, sanitary goods (e.g.: cotton wool, sanitary pads), and accommodation. These are common indirect costs incurred used in cost effectiveness analysis such as the WHO choice model (Edejer 2003). Lost income includes not only that of the woman, but also for other people involved in her care-seeking (e.g.: friend, relative). Unofficial payments refer to direct clandestine payments made to personnel, including doctors, at any point in care seeking. We ran bootstrap simulations (n=10,000) to obtain more robust estimates of the costing coefficients and the confidence intervals. Bootstrapping was done in order to resample the data as there is uncertainty around the true population. It employs the original data in a resampling exercise in order to give an empirical estimate of the sampling distribution of that estimate. It also allows to calculate bias measures which can tell us how the sample might affect the final result. For more information on bootstrapping see (Mooney, Duval et al. 1993). The margins of the confidence intervals (CIs) and the results (not shown here) showed a low level of bias.

The table highlights a series of complex issues. Women who sought a SA from UTH incurred the lowest overall costs (US$52.6). Women who sought PAC following an unsafe abortion had to pay substantially more (US$82.4). Of those women who sought PAC following an unsafe abortion, women who initiated a medical abortion unsafely incurred higher costs compared to women who used some other unsafe method (US$82.4 vs. US$62.5). These differences are likely due to the following reasons: women who seek unsafe abortion go through several stages including attempting an abortion, seeking care, and then being referred to UTH. All these layers add up. In addition, more severe complications incur extra medical costs and possibly greater unofficial provider payments.

Our findings demonstrate that focusing only on direct costs of care seriously underestimate the costs that women incur. Across all three treatment routes, women pay substantial amounts of money in order to access and use services, from taxi fares to subsistence to sanitary products. Women who sought PAC following a non-medical unsafe abortion incurred the highest relative miscellaneous costs, reflecting that this group included some women who had severe complications and had to be hospitalised for in-patient treatment (e.g.: for sepsis).

Irrespective of the type of abortion care sought, unofficial payments to health professionals represent a significant component of the costs that women have to pay. For women seeking a safe abortion at UTH, these payments represent 32% of the overall cost of abortion care-seeking. Whilst representing a lower proportion of costs (27%), the unofficial provider payments paid by women who initiated a medical abortion outside of the regulated sector were highest, probably because providers know these women are more desperate for their services. This group of women also had substantially higher costs related to the purchase of medicines, accounted for by the need to purchase the medical abortion drugs under the counter.

For both safe abortion and PAC after an unsafe non-medical abortion, costs increase with wealth (Figure 3). This finding is in line with health-related costs for other reasons and in other settings, where it has been shown that the level of fees (especially illegal fees to health practitioners) changes on the basis of "ability to pay", with wealthier patients paying more (Russell 1996). This finding is further explored and supported in the subsequent multivariate regression of the burden of costs.

Determinants of cost

To understand which women incur the highest costs for abortion-related care, and to account for confounding factors, we ran a linear regression with costs as the outcome variable. We controlled for age, education, wealth tercile, whether the woman has a co-resident partner at the time of the interview, parity, type of ward (whether high or standard), and her treatment route (Table 3).

The regression shows only a mild significant effect of age, with increasing costs with increasing age. The richest wealth tercile has the highest costs and women who were treated via the high cost ward incurred the highest costs. That the cost-wealth gradient is not more significant is worrying, however, as it suggests that the relative burden of costs is heaviest for poorer women. The results underline that PAC following an unsafe abortion is more costly than safe abortion.

Limitations

The study is based on data collected at an urban tertiary hospital in Lusaka, with a large catchment area. Although this catchment includes rural areas, and our sample is representative of women seeking care at UTH, the majority of Zambia's population lives in rural areas beyond the catchment of UTH. Our findings cannot capture their experiences. Nevertheless, our research design allows us to rigorously document the economic implications of abortion care-seeking in the diverse socio-demographic group that access

government care in Lusaka. In doing so, this study represents a first step, but by no means the whole picture, in assessing the economic implications of pregnancy termination in Zambia.

The research focuses on women who have accessed care at UTH. Our sampling approach is pragmatic, but excludes undefined proportions of women who had an unsafe abortion with no complications, women who sought non-hospital based PAC (more likely to have less serious complications), women who died as a result of unsafe abortion complications (who overall are likely to be poorer), and women who sought safe abortion in private healthcare facilities (partly addressed by the inclusion of "high cost" ward patients).

Our sample recruitment took place during weekdays (Monday-Friday), potentially excluding a different sample of women that sought services at weekends or night-time. When we tried collecting data at weekends the strategy did not yield many cases.

Because of fear and stigma of induced abortion, some women presenting at UTH for PAC following unsafe abortion report they have had a spontaneous abortion. Cases in which induced abortion was suspected or indicated by clinical staff but not reported by the woman were not included in our study.

Finally, we have not calculated the savings in costs that would have been achieved if some women had used effective contraception. This was beyond the scope of this paper. We have not considered the long term consequences of morbidity resulting from unsafe abortion. Nor have we considered the costs of unsafe abortions that result in death. Mortality is likely to have an even greater impact on women's households. To study the impact of abortion-related mortality or long-term morbidity would demand a different research design, beyond the scope of this study.

Discussion

This study is the first attempt to document the differential costs to women of seeking abortion-related care in a low-income country where abortion is legal under a wide range of circumstances. By focusing on a country where abortion is legal, our study highlights that whilst legality is an important first step in improving women's access to safe abortion services, legal provision alone does not eliminate women's burden – health and economic – of unsafe abortion.

The collection of very detailed treatment routes, and all of their associated costs, means that we are able to disaggregate our findings across the spectrum of relative risk, from a safe abortion, to an unsafe medical abortion requiring PAC, to other unsafe abortions requiring PAC. Treating the complications of an unsafe abortion costs women up to 70% more than a safe abortion. The relative burden of these costs is highest for poorer women. Not only do poorer women pay more for abortion care relative to their wealth, but they are also more likely to have an unsafe abortion. Absolute costs increase with wealth: women pay more according to their perceived wealth status. This is in line with the literature on the ability to pay that shows patients who can afford treatment are more likely to be asked to pay (Russell 1996). Indirect payments account for the largest part of the burden demonstrating we cannot simply account for direct costing when considering the economic

burden of unsafe abortion. While direct costs are one aspect of the burden, our analyses extend our understanding of the financial burden by including indirect costs .

Our analyses demonstrate the substantial use of illegal, less-safe, medical abortion by Zambian women. Despite the high costs that women incurred obtaining medical abortion pills (e.g. from friends or pharmacists), the value placed by women on the privacy and perceived safety of this treatment route, echo findings from elsewhere (Okonofua, Shittu et al. 2014; Ramos, Romero et al. 2015; Sanhueza Smith, Peña et al. 2015; Subha Sri and Ravindran 2015). Our findings point to the need for consideration of the use of pharmacists and mid-level providers in the provision of medical abortion services in Zambia. Increased awareness and training of pharmacists and pharmacy workers about medical abortion have been identified as a key strategy to reduce unsafe abortions and their sequelae (Sneeringer, Billings et al. 2012). In Nepal, where abortion was legalised in 2002, the steepest decline in serious abortion morbidity occurred following the expansion of the safe abortion programme to include midlevel providers, second trimester training, and medication abortion (Henderson, Puri et al. 2013).

It is likely that many of the women in our study who initiated a clandestine medical abortion and subsequently sought PAC did so because they were inadequately prepared for the symptoms they could experience. If medical abortions were to be made more widely available in Zambia, for example from registered pharmacists, then a process would also need to be established which educates pharmacists about how to manage and provide follow-up post-medication. PAC provided by physicians in tertiary hospitals is estimated to cost health systems ten times more than services provided by mid-level practitioners (Grimes, Benson et al. 2006). Given the resource-constrained health system in Zambia, other routes to reducing the burden of post-medical abortion follow-up could also be considered. For example, a trial of self-administered home pregnancy tests in Vietnam after a safe medical abortion showed that home use of pregnancy tests for medical abortion follow-up was feasible and highly acceptable to women and could substantially reduce the need for clinic follow up (Sheldon, Dabash et al. 2015).

In our study, adolescents were most likely to seek an unsafe abortion, consistent with findings from elsewhere (Shah and Ahman 2012; Sundaram, Vlassoff et al. 2013). In the most recent Zambian Adolescent Health Strategic Plan (2011), unsafe abortion was identified as one of the Ministry of Health's priorities. Adolescents, particularly unmarried adolescents, face multiple barriers to accessing sexual and reproductive health (SRH) services in Zambia: healthcare providers have negative attitudes towards the provision of adolescent SRH services (Warenius, Faxelid et al. 2006) and adolescents have low levels of knowledge of the legal status of abortion in Zambia (BBC 2014).

In our study, lack of knowledge about the legal status of abortion or how to access safe abortion services, contributed to women spending a substantial amount of money on abortion-seeking care, including unsafe abortions. Health practitioners demanding unofficial payments from women seeking abortion care are exploiting women's low levels of knowledge about the law and the highly stigmatised nature of abortion in Zambia. Reliable information about safe abortion services is extremely limited in Zambia, especially for women outside urban centres. The media (broadcast, print and social) can play an influential role in this respect, and substantial efforts and resources have been used to train journalists to report objectively on the topic of abortion in Zambia (Kasongo 2015). In Indonesia, for example, the piloting of an mHealth (mobile health) service to provide information about

and increase access to safe abortion showed that this platform was acceptable to women seeking accurate information about safe medical abortion (Gerdts, Hudaya et al. 2014).

Surprisingly the most expensive route was that of PAC after a safe abortion in a health care system other than UTH. Bearing in mind the wide confidence intervals in the costing which overlap with the other two routes' estimates, this result was significant even when controlling for confounding factors in the multivariate analysis. It is feasible to assume that the hoops women have to jump in order to get appropriate and safe services are still significant. In addition it is possible that we have underestimated the most serious cases in the PAC following unsafe abortion which might have under-priced the costs. Regardless of the two disparities it is important to highlight the higher cost and burden on PAC vs safe abortion.

The most cost-effective way to deal with unsafe abortion is to provide contraceptive services that allow people to choose to avoid becoming pregnant in the first place. For many women who seek a termination, they have assumed that they had been protected from the risk of pregnancy by contraception. Just over half (53%) our sample reported that they were using some form of contraception when they became pregnant with the pregnancy that they subsequently terminated, suggesting substantial proportions of ineffective contraceptive use or method failure. Universal knowledge of contraception is clearly not translating into access to, or use of, contraceptive services. Over 7% of our sample reported that they had terminated the pregnancy because it was too soon after their last birth, suggesting that post-partum contraceptive services are inadequate.

The availability of safe abortion services requires not only an appropriate legal framework, but also support (political, popular, media, medical profession) and resources to provide it. Comparisons may be drawn with other countries where abortion has been legal for several decades (Turkey, India), but unmet need for safe abortion services remains high (Goldie, Sweet et al. 2010; Mihciokur, Akin et al. 2015). Until access to safe abortion services is substantially improved in Zambia, especially outside of major urban centres, the devastating health and economic consequences of unsafe abortion will persist.

Bibliography

Babigumira, J. B., A. Stergachis, et al. (2011). "Estimating the costs of induced abortion in Uganda: A model-based analysis." BMC public health **11**(1): 904.

Bankole, A., S. Singh, et al. (2007). Estimating the cost of post-abortion care in Nigeria: a case study. Fertility Regulation Behaviors and Their Costs: Contraception and Unintended Pregnancies in Africa and Eastern Europe & Central Asia, . Washington, DC, World Bank**:** 65-92.

BBC (2014). 'Tikambe! (Let's Talk) Project Baseline. Lusaka, Zambia, BBC Media Action.

Chisha, C. (2014). More than 10 women deliver on UTH floors everyday - Maternity survey. Zambian Watchdog Courtesy of Zambia Daily Mail.

Coast, E. (2014). Pregnancy termination trajectories in Zambia: causes and economic consequences. Marie Stopes Zambia Workshop on the Prevalence and Impact of Abortion in Zambia. Lusaka, Zambia.

Coast, E. and S. Murray (2014). Pregnancy termination trajectories in Zambia. International Seminar on Decision-making regarding abortion-determinants and consequences. I. S. P. o. A. Research. Nanyuki, Kenya, IUSSP.

CSO (2012). 2010 Census of Population and Housing National Analytical Report. C. S. Office. Lusaka, Zambia, Central Statistical Office.

CSO, MOH, et al. (2014). Zambia Demographic and Health Survey 2013-14. Rockville, Maryland, USA, Central Statistical Office (CSO) [Zambia], Ministry of Health (MOH) [Zambia], and ICF International.

DeWitt, E. M., C. A. Grussemeyer, et al. (2012). "Resource Use, Costs, and Utility Estimates for Patients with Cystic Fibrosis with Mild Impairment in Lung Function: Analysis of Data Collected Alongside a 48-Week Multicenter Clinical Trial." Value in Health **15**(2): 277-283.

Edejer, T. T.-T. (2003). Making choices in health: WHO guide to cost-effectiveness analysis, World Health Organization.

Fetters, T., K. Raisanen, et al. (2015). "Using a harm reduction lens to examine post-intervention results of medical abortion training among Zambian pharmacists." Reproductive Health Matters **22**(44, Supplement 1): 116-124.

Filmer, D. and L. H. Pritchett (2001). "Estimating wealth effects without expenditure data--or tears: An application to educational enrollments in States of India." Demography (pre-2011) **38**(1): 115-132.

Ganatra, B., O. Tunçalp, et al. (2014). "From concept to measurement: operationalizing WHO's definition of unsafe abortion." Bulletin of the World Health Organization **92**(3): 153-228.

García-Prado, A. and P. González (2007). "Policy and regulatory responses to dual practice in the health sector." Health Policy **84**(2): 142-152.

Geary, C. W., H. Gebreselassie, et al. (2012). "Attitudes toward abortion in Zambia." International Journal of Gynecology & Obstetrics **118, Supplement 2**(0): S148-S151.

Gerdts, C., I. Hudaya, et al. (2014). "Mobile health innovations for improved access to safe abortion in Indonesia." Contraception **90**(3): 299.

Goldie, S. J., S. Sweet, et al. (2010). "Alternative strategies to reduce maternal mortality in India: a cost-effectiveness analysis." PLoS medicine **7**(4): e1000264.

Grimes, D. A., J. Benson, et al. (2006). "Unsafe abortion: the preventable pandemic." The Lancet **368**(9550): 1908-1919.

GRZ (1972). Termination of Pregnancy Act, Laws of Zambia, Chapter 304. <u>Constitution of Zambia</u>. Lusaka, Government of Zambia.

GRZ (2009). Standards and Guidelines for reducing unsafe abortion morbidity and mortality in Zambia. M. o. Health. Lusaka, Government Printers.

GRZ (2012). The minimum wages and conditions of employment act. B. a. L. G. o. t. R. o. Z. Ministry of Information. Lusaka. **Statutory instrument 45**.

Guttmacher Institute (2012). Facts on Abortion in Africa. <u>In Brief</u>. New York, Guttmacher Institute.

Henderson, J. T., M. Puri, et al. (2013). "Effects of Abortion Legalization in Nepal, 2001–2010." <u>PLoS ONE</u> **8**(5): e64775.

Hendrickson, C., T. Fetters, et al. (2015). "Client–pharmacy worker interactions regarding medical abortion in Zambia in 2009 and 2011." <u>International Journal of Gynecology and Obstetrics</u>.

Hodorogea, S. and R. Comendant (2010). "Prevention of unsafe abortion in countries of Central Eastern Europe and Central Asia." <u>International Journal of Gynecology & Obstetrics</u> **110, Supplement**(0): S34-S37.

Ilboudo, P. G. C., G. Greco, et al. (2015). "Costs and consequences of abortions to women and their households: a cross-sectional study in Ouagadougou, Burkina Faso." <u>Health Policy and Planning</u> **30**(4): 500-507.

Kasongo, G. C. (2015, 20 February 2015). "PSAf challenges editors and reporters to stop unsafe abortions in Zambia." from <u>http://www.comminit.com/global/content/psaf-challenges-editors-and-reporters-stop-unsafe-abortions-zambia</u>.

Kik, S., S. Olthof, et al. (2009). "Direct and indirect costs of tuberculosis among immigrant patients in the Netherlands." <u>BMC Public Health</u> **9**(1): 283.

Konje, J. C., K. A. Obisesan, et al. (1992). "Health and economic consequences of septic induced abortion." <u>International Journal of Gynecology & Obstetrics</u> **37**(3): 193-197.

Koster-Oyekan, W. (1998). "Why resort to illegal abortion in Zambia? Findings of a community-based study in Western province." <u>Social Science & Medicine</u> **46**(10): 1303-1312.

Kruk, M. E., G. Mbaruku, et al. (2008). "User fee exemptions are not enough: out-of-pocket payments for 'free' delivery services in rural Tanzania." <u>Tropical Medicine & International Health</u> **13**(12): 1442-1451.

Lachin, J. M. (1981). "Introduction to sample size determination and power analysis for clinical trials." <u>Controlled clinical trials</u> **2**(2): 93-113.

Levin, C., D. Grossman, et al. (2009). "Exploring the costs and economic consequences of unsafe abortion in Mexico City before legalisation." <u>Reproductive Health Matters</u> **17**(33): 120-132.

Likwa, R., A. Biddlecom, et al. (2009). "Unsafe Abortion in Zambia: In Brief." <u>Guttmacher Institute</u> **2009 Series**(3).

Macha, S., M. Muyuni, et al. (2014). "Increasing access to legal termination of pregnancy and postabortion contraception at the University Teaching Hospital, Lusaka, Zambia." <u>International Journal of Gynaecology and Obstetrics</u> **126**(1,SUPPL): 4-6.

Machungo, F., G. Zanconato, et al. (1997). "Socio-economic background, individual cost and hospital care expenditure in cases of illegal and legal abortion in Maputo." <u>Health & Social Care in the Community</u> **5**(2): 71-76.

McCoy, D., S. Bennett, et al. (2008). "Salaries and incomes of health workers in sub-Saharan Africa." <u>The Lancet</u> **371**(9613): 675-681.

Measure DHS. (2013). "Survey Summary: Zambia Standard DHS, 2013." Retrieved 30 September, 2013, from <u>http://www.measuredhs.com/what-we-do/survey/survey-display-406.cfm</u>.

Mihciokur, S., A. Akin, et al. (2015). "The unmet need for safe abortion in Turkey: a role for medical abortion and training of medical students." Reproductive Health Matters **22**(44, Supplement 1): 26-35.

MoH (2009). Standards and guidelines for reducing unsafe abortion morbidity and mortality in Zambia. Lusaka, Ministry of Health**:** 1-64.

Mooney, C. Z., R. D. Duval, et al. (1993). Bootstrapping: A nonparametric approach to statistical inference, Sage.

MSZ. (2015). "Marie Stopes Zambia." Retrieved 04/04/2015, 2015, from http://www.ppaz.org.zm/what-we-do/reproductive-health-centres/index.php.

Narkavonnakit, T. and T. Bennett (1981). "Health consequences of induced abortion in rural northeast Thailand." Studies in Family Planning: 58-65.

Okonofua, F., O. Shittu, et al. (2014). "Acceptability and feasibility of medical abortion with mifepristone and misoprostol in Nigeria." International Journal of Gynecology & Obstetrics **125**(1): 49-52.

Parmar, D., T. Leone, et al. (2014). A comparative study of health systems costs of safe abortion and post abortion care in Zambia. Third International Conference of the African Health Economics and Policy Association (AfHEA). 11th-13th March, 2014. Nairobi, Kenya.

Potdar, R., T. Fetters, et al. (2008). "Initial loss of productive days and income among women seeking induced abortion in Cambodia." Journal of Midwifery & Women's Health **53**(2): 123-129.

PPAZ. (2015). "Planned Parenthood Association of Zambia: Reproductive Health Centres." Retrieved 04/04/2015, 2015, from http://www.ppaz.org.zm/what-we-do/reproductive-health-centres/index.php.

Ramos, S., M. Romero, et al. (2015). "Women's experiences with the use of medical abortion in a legally restricted context: the case of Argentina." Reproductive Health Matters **22**(44, Supplement 1): 4-15.

Russell, S. (1996). "Ability to pay for health care: concepts and evidence." Health Policy and Planning **11**(3): 219-237.

Sanhueza Smith, P., M. Peña, et al. (2015). "Safety, efficacy and acceptability of outpatient mifepristone-misoprostol medical abortion through 70 days since last menstrual period in public sector facilities in Mexico City." Reproductive Health Matters **22**(44, Supplement 1): 75-82.

Sedgh, G., S. Singh, et al. (2012). "Induced abortion: incidence and trends worldwide from 1995 to 2008." The Lancet **379**(9816): 625-632.

Shah, I. H. and E. Ahman (2012). "Unsafe abortion differentials in 2008 by age and developing country region: high burden among young women." Reproductive health matters **20**(39): 169-173.

Sheldon, W., R. Dabash, et al. (2015). Assessing early medical abortion success using a semiquantitative pregnancy test: Can we shorten the medical abortion process? GLOW Conference. Royal College of Obstetricians and Gynaecologists, London.

Sneeringer, R. K., D. L. Billings, et al. (2012). "Roles of pharmacists in expanding access to safe and effective medical abortion in developing countries: A review of the literature." JOURNAL OF PUBLIC HEALTH POLICY **33**(2): 218-229.

Subha Sri, B. and T. K. S. Ravindran (2015). "Safe, accessible medical abortion in a rural Tamil Nadu clinic, India, but what about sexual and reproductive rights?" Reproductive Health Matters **22**(44, Supplement 1): 134-143.

Sundaram, A., M. Vlassoff, et al. (2013). "Documenting the Individual-and Household-Level Cost of Unsafe Abortion in Uganda." International Perspectives on Sexual and Reproductive Health **39**(4): 174–184.

T-T Edejer, R., R. Tessa, et al. (2004). <u>Making choices in health: WHO guide to cost-effectiveness analysis</u>. Geneva, World Health Organization.

Vlassoff, M., S. M. Furere, et al. (2013). The health system cost of post-abortion care in Rwanda. <u>PAA 2013</u>.

Vlassoff, M., F. Mugisha, et al. (2012). "The health system cost of post-abortion care in Uganda." <u>Health Policy and Planning</u>.

Vlassoff, M., S. F. Musange, et al. (2014). "The health system cost of post-abortion care in Rwanda." <u>Health Policy and Planning</u>.

Vlassoff, M., J. Shearer, et al. (2008). "Economic Impact of Unsafe Abortion-Related Morbidity and Mortality: Evidence and Estimation Challenges." <u>IDS Research Report</u> **59**: 94.

Vlassoff, M., D. Walker, et al. (2009). "Estimates of health care system costs of unsafe abortion in Africa and Latin America." <u>International perspectives on sexual and reproductive health</u> **35**(3): 114-121.

Warenius, L. U., E. A. Faxelid, et al. (2006). "Nurse-midwives' attitudes towards adolescent sexual and reproductive health needs in Kenya and Zambia." <u>Reprod Health Matters</u> **14**(27): 119-128.

WHO (1993). The Prevention and management of unsafe abortion: report of a technical working group, Geneva, 12-15 April 1992. Geneva, World Health Organization.

WHO (2003). WHO-CHOICE (Choosing Interventions that are Cost-Effective) price database.

Woog, V., S. Singh, et al. (2007). A review of the evidence on the cost of post-abortion care in Africa. <u>Fertility regulation behaviors and their costs: contraception and unintended pregnancies in Africa and eastern Europe & central Asia</u>. E. Lule, S. Singh and S. A. Chowdhury. Washington, World Bank**: 40-92.

ZAGO. (2014). "Zambia Association of Obstetricians and Gynaecologists: Fully paid up members." Retrieved 04/04/2015, 2015, from http://directpluszambia.wix.com/zago#!members/c1vgx.

Table 1: Socio-demographic characteristics of respondents

Socio-economic characteristics	Percentage (N=112)
Age	
14-19	24.3
20-24	28.7
25-29	13.9
30-34	15.7
35+	17.4
Number of children	
0	42.4
1	26.6
2+	31.0
Educational attainment	
Nursery/Kindergarten	13.1
Primary	36.0
Secondary	35.1
Higher	15.8
Main Occupation	
Employed, full-time	19.3
Employed, part-time	5.3
Full-time housewife	11.4
School student	18.4
College/university student	11.4
Unpaid family worker	2.6
Operates own business	17.5
Unemployed and looking for work	5.3
Other	8.8

Table 2: Average Costs incurred by women for safe abortion and post-abortion care following an unsafe abortion, Lusaka, 2013

	SAFE ABORTION	PAC FOLLOWING AN UNSAFE ABORTION		
		UNSAFE MEDICAL ABORTION INITIATED ELSEWHERE	OTHER UNSAFE ABORTION INITIATED ELSEWHERE	All UNSAFE ABORTION COMBINED
Health centre/Hospital Fees (CI in KW)	$6.3 (KW33.71) (22.16-45.27)	$14.4 (kw77.3) (0-188.6)	$5.5 (KW29.7) (11.9-47.5)	$9.9 (KW53.49) (5.9-121.55)
Fees for tests (including pregnancy test) (CI in KW)	$2.9 (KW15.7) (6.5-24.9)	$3.1 (KW16.4) (3.2-29.7)	$5.5 (KW29.7) (4.9-54.5)	$4.7 (KW25.4) (8.4-42.3)
Medicines (CI in KW)	$0.3 (KW1.6) (0-3.4)	$18.3 (KW98.3) (22.4-174.0)	$4.1 (KW 22.2) (0-58)	$8.7 (KW46.9) (12.5-81.5)
Unofficial provider payment (CI in KW)	$16.9 (KW90.9) (4.9-176.9)	$22.3 (KW120.0) (0-259)	$15.1 (KW80.9) (0-164)	$17.4 (KW93.6) (25.8-161.3)
Lost income (CI in KW)	$12.4 (KW66.4) (0-147)	$9.6 (KW51.6) (0-109.9)	$16 (KW86.0) (14.4-157.6)	$13.9 (KW74.9) (24.7-125.2)
Miscellaneous indirect (e.g.: transport, meals, sanitary goods/cotton wool, accommodation) (CI in KW)	$14.5 (KW78.21) (10.3-146.1)	$12.1 (KW65.2) (20.2-110.2)	$16.8 (KW90.2) (28.6-151.8)	$15.3 (KW82.1) (39.4-124.8)
Total (CI in KW)	**$52.6 (KW283.0)** (217-348)	**$82.4(KW443)⁾** (236-650)	**$62.5 (KW362.9)** (220-505)	$72.36(KW389.1) (275.9-502.3)

Table 3 Linear regression determinants of total costs for treatment

	B coeff	Standard Error
Age		
<19	Ref	
20-24	-60.060	92.460
25-29	68.030	82.487
30-34	191.670*	105.926
35+	182.520	116.422
Parity	11.743	30.653
Wealth asset tercile		
Poorest	Ref	
Middle	146.453	91.916
Richest	217.188**	98.646
Treatment route		
Safe abortion	Ref	
PAC after unsafe medical abortion	230.991**	90.086
PAC after unsafe non-medical abortion	135.024*	74.226
Has a co-resident partner at time of interview		
No	Ref	
Yes	-174.421	78.507
Type of ward		
Standard	Ref	
High cost	151.626*	90.633
Constant	153.990*	92.460

Note: *0.10<p<0.05, **0.05<p<0.01

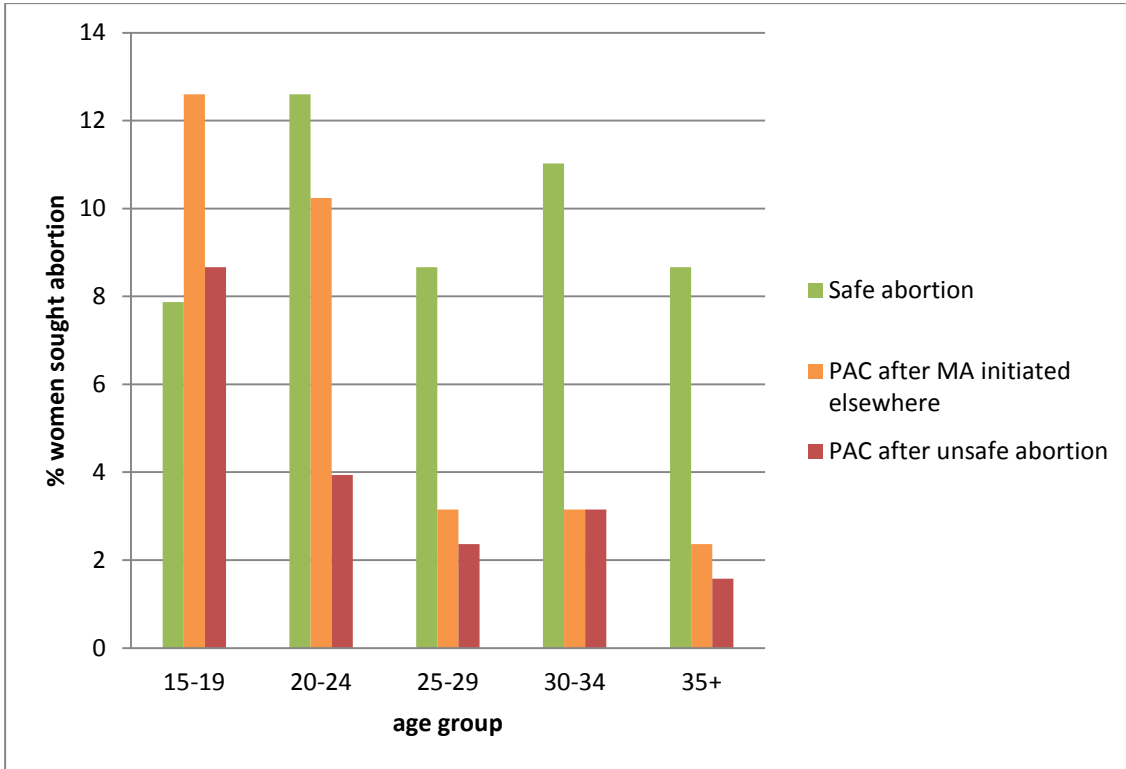**Figure 1 Percentage of women by abortion trajectory, type and age**

Figure 2 Percentage of women by abortion trajectory type and wealth tercile
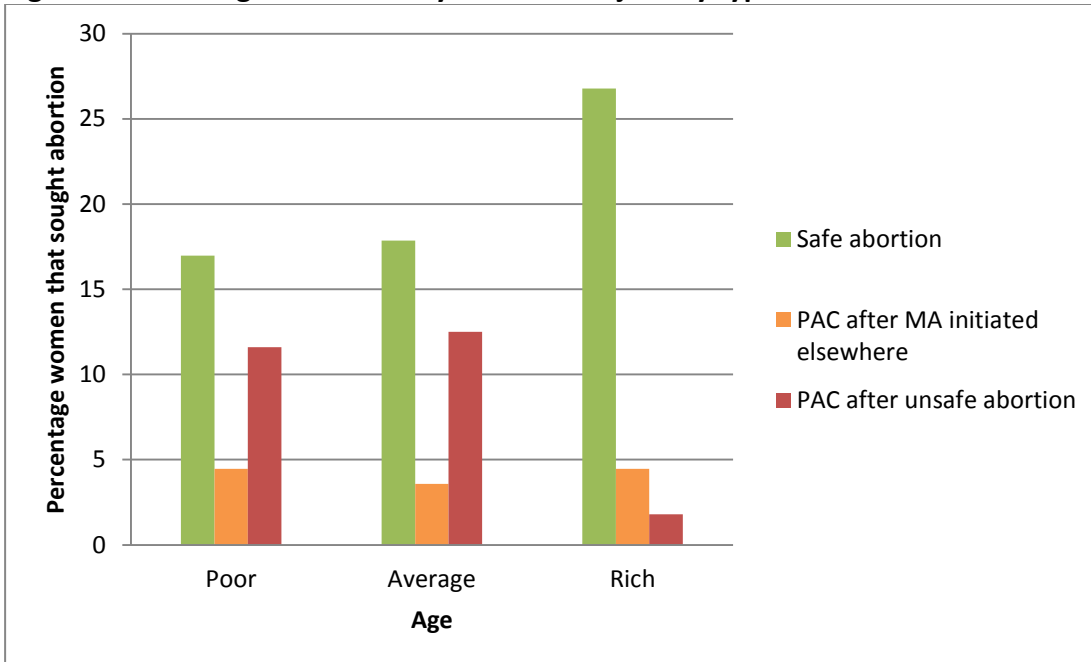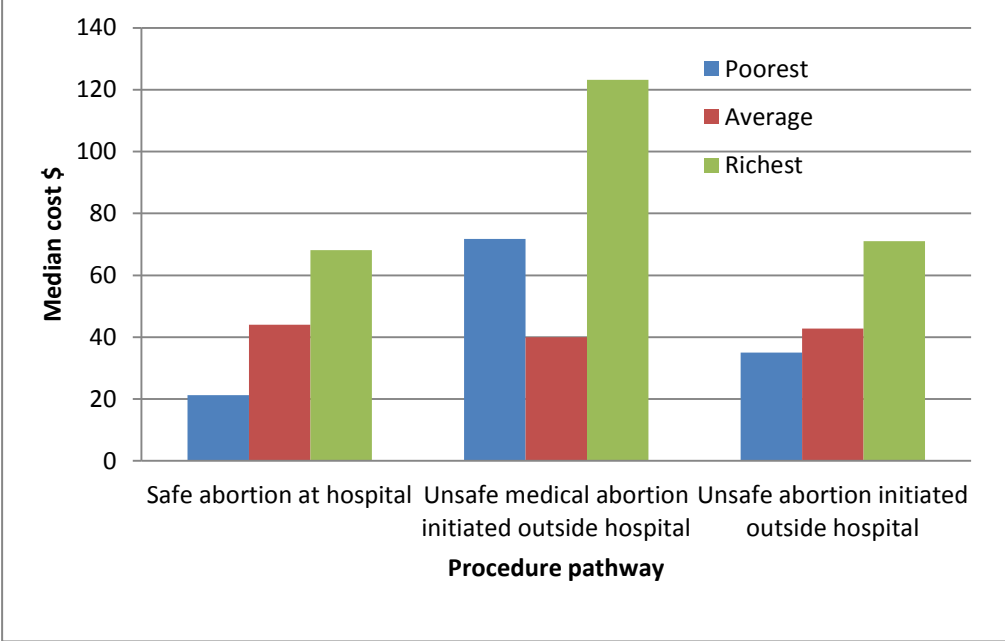
Fig 3 Median overall cost in US$ by abortion trajectory and wealth tercile

Note: Pearson correlation=0.233 (sig=0.014)