PRELIMINARY – PLEASE DO NOT CITE WITHOUT PERMISSION

Impact of a Youth-Targeted Reproductive Health Initiative on Teen Pregnancy in South Africa

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Abstract:
In the early 2000s, the NGO loveLife, in partnership with the South African Department of Health, rolled out the National Adolescent Friendly Clinic Initiative (NAFCI) with the goal of preventing HIV and unwanted pregnancy through education and increased clinical access to reproductive health services. By 2010, 500 clinics were accredited as "youth friendly." Based on interviews with stakeholders and a series of controls, I argue that the roll-out led to a conditionally random increase in reproductive health knowledge and clinical access for adolescents. I use GPS data and historical residence information from secure National Income Dynamics Study data to geolink respondents' location during their early teen years to the accreditation date and location of NAFCI clinics. Preliminary results show that women who lived within 5 km of a NAFCI clinic when they were 12-17 years old are significantly less likely to experience a birth before the age of 18.

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In the early to mid-2000, a National Adolescent Friendly Clinic Initiative (NAFCI) was rolled out to clinics across South Africa. Based on interviews with stakeholders, a series of controls, and evidence of a trend breaks in service provision; I argue that the rollout led to a conditionally random increase in adolescent access to reproductive health services. My analysis is based on geo-linking data from several sources to construct a measure of access to NAFCI clinics for South African adolescents and comparing fertility outcomes for women who lived near accredited clinics in adolescence compared to those who did not. I find that women who lived within 5 km of a NAFCI clinic when they were 12 to 17 years old are significantly less likely to experience a birth before the age of 18.

I. Background and Description of the National Adolescent Friendly Clinic Initiative

A. Fertility Timing and Contraceptive Access in Early Post-Apartheid South Africa

The 1998 South African Demographic and Health Survey (DHS) provides context for the early post-Apartheid contraceptive and fertility patterns that motivated the National Adolescent Friendly Clinic Initiative.[1] Thirty-five percent of 19 year-olds (and 25 percent of 18 year olds) reported ever being pregnant (DHS 1998: Final Report 2002).[2] While this rate of adolescent childbearing is low compared to other sub-Saharan countries, teen childbearing in South Africa is more likely to be non-marital, rather than the result of early marriage (Macleod and Tracey, 2010, United Nations Population Fund, 2003). Only 1.2 percent of South African 15-19 year olds were married in 1998. There was also evidence of "widespread" and "endemic" gender

[1] Apartheid was a system of strictly enforced racial segregation in South Africa. Apartheid officially ended with multi-racial democratic elections in 1994. While laws no longer classify citizens by the color of their skin, the classifications of White, Coloured, Black African, and Indian are still used in everyday conversation and are designations in surveys including the South African Census.

[2] Among 19 year-olds 30.2 report being a mother, and among 18 year olds, 19.8 report being a mother.

violence and coercive sex experienced by teenage girls in South Africa (Wood et al., 1998).[3] And rates of unintended pregnancy among South African teens were high--78 percent of mothers under the age of 20 reported that their last birth was not wanted or wanted later (DHS 1998).

The Apartheid regime's plan to control the non-white population led to relatively high contraceptive prevalence in South Africa compared to other sub-Saharan countries (Cooper et al., 2004). Contraceptives were widely available at no cost at public clinics, hospitals and through mobile service provision.[4] However, the high rate of unintended pregnancy among teens implies that South African adolescents had a substantial unmet "need" for family planning.

Based on birth histories from the National Income Dynamics Study (NIDS), Figure 1 shows patterns of age-at-first-birth by cohort, and Figure 2 shows children-ever-born by age-at-first-birth across cohorts. Figure 1 shows that after a decrease in the early-teen birth rate from the 1960 to 1970 birth cohorts, the proportion of 18 and 19 year olds who had given birth remains nearly constant for the 1970, 1980 and 1990 cohorts. At the same time, Figure 2 shows that among women born between 1980 and 1990, who were adolescents in this early post-apartheid era, a teen birth was much more likely to be followed by a substantial space before the next birth than for earlier cohorts; so that completed fertility is converging for women having early versus late first births in the post-apartheid period. The pattern of falling overall fertility in South Africa combined with little change in age at first birth is consistent with teen mothers only starting to use contraception *after* a first birth.

[3] A qualitative study in an African township in peri-urban Cape Town in the mid-1990s found that over 60% of female respondents aged 14-18 reported having sex against their will, and 59% reported have been beaten by their male partners (Wood, et al., 1998). Note, however, that rates of physical abuse by teenage girls in DHS 1998 are substantially lower. According to Human Rights Watch, in 1995 South Africa had the highest recorded per capita rate of rape of for a country not at war.

[4] Long-acting injectable contraceptive were, and remain, the most common method used (DHS 1998, DHIS 2013).

Why were sexually active teens who did not want to get pregnant not using contraceptives when they were widely available for free? Qualitative studies in various South Africa regions aimed to address this question (Abdool Karim et al., 1992, Ehlers, 2003, Jewkes et al., 2001, Mfono, 1998, Wood and Jewkes, 2006). The findings pointed to social barriers to adolescent access to family planning. First, teens seemed to lack accurate sexual and contraceptive knowledge. For example there were widespread fears stoked by religious leaders and even nurses that hormone-based contraceptive use by adolescents could cause permanent infertility.[5] Next, stigmatization of adolescent sex by health care providers often made clinics inhospitable. Teens reported scolding and even abusive behavior by staff and nurses at public clinics and hospitals when they sought contraceptives, and in some cases even refusal to provide contraceptives.

Concerns among health advocates and the Department of Health about these barriers to adolescent access to reproductive health services were also driven by the increasing prevalence of HIV among youth, particularly teenage girls. Department of Health surveys found that in 1998 and 1999, approximately 20% of pregnant 15-19 year olds were HIV positive (substantially higher in some regions such as KwaZulu Natal) (Allen et al., 2000, Jewkes, et al., 2001). HIV prevalence among 15-24 year olds was estimated to be three times higher among young women than young men--15.% versus 4.8% (Pettifor et al., 2005).

B. The National Adolescent Friendly Clinic Initiative

High rates of unintended teen pregnancy and escalating rates of HIV among young people were the driving force behind the establishment of the non-governmental public health

[5] (Jewkes, et al., 2001) report that teen "mothers often indicate that teenage pregnancy is infinitely preferable to the possibility of infertility caused by contraceptive use … This is widely perceived by women and family planning nurses to be a side-effect of progesterone based injectable contraceptives, particularly Depo Provera" This notion was also espoused by "preachers at local African churches".

advocacy organization, loveLife, in 1999. The National Adolescent Friendly Clinic Initiative (NAFCI) was key element of loveLife's strategy that also included high-profile media campaigns and sporting events promoting "more open and better informed communication about sex, HIV, sexuality and gender relations." loveLife launched NAFCI in consortium with several other non-governmental organizations and partnership with the South African Department of Health.[6]

NAFCI had a clinical component aimed at reducing physical and social barriers to accessing reproductive health services, and an education component focused on sex education and relationship skills. The clinical component was based on an "accreditation model" whereby clinics worked towards service standards through a quality improvement process and were rewarded tiered levels of accreditation based on external assessments. The intensive accreditation process, which typically lasted a year, involved training nurses as well as non-medical staff, equipping facilities to offer the services and pharmaceuticals youth need, youth-targeted educational materials, and publicizing the clinics' youth friendliness through signage and community outreach. NAFCI's education component involved building dedicated spaces *at* clinics for youth education and socialization called "chill rooms" and employing local youth to facilitate sex-education programs.[7] Exhibit 2 gives examples of "youth friendly" signage and Exhibit 3 shows local peer educators called groundBREAKERS at a NAFCI clinic chill room.

NAFCI was piloted at 10 clinics starting in 2000. A major scale-up occurred in 2004 and 2005 resulting in 350 active NAFCI sites by the end of 2005. By 2010, almost 500 clinics across the country were accredited as "youth friendly," or approximately ten percent of all public clinics. Figure 3 shows the rollout of accredited clinics by activation year and province. Each

[6] Other organizations involved in the consortium were Planned Parenthood, the Reproductive Health Research Unit (RHRU) at the University of Witwatersrand and the Health System Trust.

[7] The clinical accreditation process is described in detail in Ashton et al. (2009), and Dickson-Tetteh et al. (2001). The ten NAFCI standards are listed in Exhibit 1. The education component of NAFCI is also discussed in Ashton et al. (2009).

NAFCI clinic is assigned at least one full-time loveLife groundBREAKERs aged 18 to 25. In 2013, 1200 groundBREAKERS were employed nationwide, assisted by 6000 to 8000 part-time youth volunteers[8].

There is limited evidence on the effectiveness of interventions aimed at increasing adolescent utilization of health services. In 2006, the World Health Organization reviewed evidence from 16 published and unpublished studies and concluded that "the evidence is weak and the findings not conclusive" due in large part to lack of detailed descriptions of the interventions and insufficient outcome data (Dick et al., 2006). The review cites one randomized control study in Nigeria that finds improvements in knowledge and treatment-seeking behavior for sexually transmitted diseases (STD) among high-school students from a school-level treatment involving "community participation, peer education, public lectures, health clubs in the schools, and training of STD treatment providers" (Okonofua et al., 2003). By estimating the impact of NAFCI on teen pregnancy, this paper is the first to my knowledge to examine the impact of youth friendly services on fertility outcomes.

II. Data and Empirical Strategy to Measure the Impact of NAFCI on Early Teen Pregnancy

This paper's research design is facilitated by geo-linking data on the timing and location of the NAFCI rollout to birth histories in nationally representative survey data. My empirical specification uses proximity to a NAFCI clinic during adolescence as a plausibly exogenous measure of access to reproductive health services and estimates the impact on early teen fertility. Linked census and health provision data provide controls and evidence on the impact of the initiative. Data on satellite locations that only offered the education component of the program

[8] http://www.lovelife.org.za/corporate/lovelife-programmes/youth-leadership-development/groundbreakers/

but were not linked to a clinic may help to separate out the impacts of the clinical versus the education components.

A. Data to Geo-link NAFCI Rollout to Adolescent Birth Histories

I geo-link several datasets to implement my research design: 1) loveLife Project Monitoring Databases, 2) District Health Information System (DHIS) GPS and Service Provision-by-Facility files, 3) National Income Dynamics Study (NIDS) Secure Data and Secure Administrative Data, and 4) the 2001 South African Census.

The loveLife Project Monitoring Databases provides names of each NAFCI clinic and month and year the accreditation process began. Based on interviews with loveLife and clinic staff, I estimate that the effective start date of "youth friendly" services is one year after accreditation began.[9] District Health Information System (DHIS) facility-level files provide GPS coordinates and monthly service provision data for every public health facility in South Africa from 2001 to 2012.[10] Figure 4 shows the location and start year of NAFCI clinics from 2000 to 2010 based on linking the loveLife database with the DHIS. I also use contraceptive distribution (including the two major injectables, pills, iuds, condoms) and reported sexually transmitted diseases (STIs) aggregated to an annual level to track changes in service provision by facility type—NAFCI or non-NAFCI.

The National Income Dynamics Study (NIDS) is a nationally representative longitudinal household survey of over 28,000 individuals in 7,300 households fielded every two years starting in 2008. NIDS includes detailed birth histories for all women over the age of 14 at the time of

[9] The database also provides start dates and locations for loveLife "outlets" which provide the education component of the program, but are not linked to a health facility.

[10] The District Health Information System (DHIS) is a health management information system and data warehouse developed by the Health Information Systems Programme (HISP) used by the South African Department of Health (DOH) to collect and monitor routine health data. This data is the basis of the annual South African District Health Barometer that provides indicators of the health system at district level. Monthly facility-level data was obtained with authorization from the DOH and with assistance from HISP.

interview. NIDS secure data includes GPS coordinates of residence at time of interview as well as residency history including city/suburb of birth, residence in 1994 and 2006, 2009 and 2011.[11] Secure administrative data also include GPS of last school attended, which is important as youth often go to clinics near school rather than home both for convenience and confidentiality.

The key variables in my analysis are age at first birth and distance of residence (or school) to a NAFCI clinic during adolescence. I define a sample of approximately 2000 female NIDS respondents age 19 to 26 in 2010 (wave 2).[12] I create a birth history variable with three categories: first birth by 18, first birth after 18 or no births. I use retrospective residence questions to determine where each woman lived each year when she was aged 12 to 17. If she still resides in that location by default I have the GPS of residence during adolescence; otherwise I use the GPS of the centroid of the "main-place" of residence to approximate her location in adolescence.[13] I calculate the distance in kilometers from residence (school) to the nearest NAFCI clinic for each year a woman was 12 to 17.[14] I create a binary variable for whether she lived (went to school) within five kilometers of a NAFCI clinic.[15] I also create a variable for distance to any public health facility at age 15.

Finally, I link each respondent to her reported sub- (or main-)place of residence at age 15 and construct a set of variables describing demographic characteristics for each sub- and main-place in the 2001 South African census including rural/urban status, and percent of the

[11] Secure NIDS data can only be accessed at the DataFirst secure facility at the University of Cape Town upon approval by the NIDS management committee at the Southern African Labour and Development Unit.
[12] This age range was chosen with an eye to examining second-stage employment outcomes—women who are old enough to plausibly be out of secondary school in the labor force.
[13] Retrospective location questions were asked at a suburb/town level, but the raw responses are currently coded only to the main-place level. In the future this coding could be refined to a finer level of detail. See Appendix Figure 1. for a description of census geographic sub-categories from province down to the enumeration area.
[14] Distances are calculated using the user-written command geonear (Picard, 2010). "geonear- finds the nearest neighbors using geodetic distances, i.e.the length of the shortest curve between two points along the surface of a mathematical model of the earth."
[15] I chose 5 km based on conversations with clinic staff and loveLife provincial managers as a "reasonable" distance a teen would be willing to travel to visit a clinic. This is a "common" distance to travel to a clinic in a rural area.

population 20 and over with less than 12 years of schooling as a proxy for socio-economic status. These serve as pre-policy control variables—NAFCI was piloted as early as 2000, but the main rollout occurred in the mid-2000s.[16]

B. Empirical Strategy to use NAFCI Rollout as Plausibly Exogenous Increase Access to Reproductive Health Services

My empirical strategy exploits NAFCI's staged rollout across South Africa to identify the impact of changes in adolescent access to contraception and sex education on early teen pregnancy. The key identification assumption is that the timing and location of clinic accreditation is uncorrelated with other determinants of fertility timing. For example I need to assume that clinic locations were not chosen where teen fertility, either in terms of levels or trends, was different than other locations. Similarly if accreditation was pursued where demand for contraception was highest, this would also threaten identification. I provide both empirical and institutional evidence to suggest that NAFCI clinic accreditation represents a conditionally random increase in access to contraception and reproductive health knowledge.

First, to provide evidence that NAFCI had an impact on service provision at clinics, I use facility-level DHIS data to measure changes in reproductive health services provided at NAFCI relative to non-NAFCI clinics before and after accreditation using an event-study framework (Jacobson et al., 1993). Figure 5 shows relative changes in service provision controlling for national trends in provision using non-NAFCI clinic controls and calendar year-fixed effects. After accreditation there is a trend break in the number of condoms distributed (increase) and STIs reported (decrease) at NAFCI clinics compared to non-NAFCI clinics. The relatively flat

[16] While the census does not include extensive controls, I plan to expand these demographic variables to include access to services – electricity, water etc--and a measure to poverty.

pre-accreditation trend lends credibility to the assumption that the initiative did not target clinics that were already different from the average clinic. Meanwhile, evidence for a trend break in injectable contraceptives is less conclusive.[17]

Next I regress whether a respondent lived near a NAFCI clinic during adolescence on 2001 characteristics (urban/rural status and percent with less than secondary degree) of the main-place where the respondent lived at age 15 and on district council fixed effects. Many of the coefficients (Appendix Table 1) are statistically significant which is not surprising as the initiative was generally focused on areas of high need and low socio-economic status[18]. However, only around 10 percent of all clinics were accredited as youth friendly by 2009 and I control for all of these variables when estimating the impact of NAFCI. As long accreditation was random *conditional* on these controls, the identification assumption will still hold. Granted, this remains a strong assumption given the evidence provided so far. I will continue to collect empirical evidence through more extensive controls and in the meantime I argue the case of conditionally random placement based on institutional knowledge gathered though interviews with stakeholders involved with the rollout process.

Based on these interviews, my understanding is that clinics were chosen in a relatively ad hoc way that varied by province and district. [19] According to the first director of loveLife, statistics on teen pregnancy of HIV were not used as selection criteria as those statistics did not exist with any geographic detail at the time. I was told on multiple occasions that since clinics

[17] However, the downward trend in Medroxyprogesterone (commonly known as Depo Prevera) and upward trend in Norethisterone Enanthate (commonly known as Net-En) could possibly be explained by nurses incorporating NAFCI training by attempting to dispel the perception that Net-En is "not for youth." The evidence on injectable provision will be explored more fully.

[18] I also plan to run a similar analysis of accreditation timing.

[19] I conducted extensive interviews with eight current and past employees and consultants of loveLife. I interviewed two provincial managers who were at loveLife during the initial implementation of the program. I visited NAFCI-accredited clinics in the provinces of Gauteng, Eastern Cape and Western Cape where I met with nurses and local loveLife youth peer educators.

were usually chosen by provincial or district level departments of health, varying personalities and agendas of provincial or district managers led to a "random" mix of clinics across the country (though they did not mean a formal random selection process was used). In some cases "struggling" clinics were targeted and in others clinics that were perceived to be doing relatively well were rewarded by being chosen to participate in the program. There were many more clinics that either wanted to be involved, or that district managers wanted to be involved, than could be accommodated due to the intensity and expense of the program. NAFCI was targeted at high-need communities; however, there is an abundance of high-need communities across South Africa. I feel confident that many clinics that were otherwise similar to chosen clinics were not selected simply due to lack of funds, organization and time.

There are other tests and robustness analysis that could strengthen the plausibility of a conditionally random rollout. For example, I plan to test if pre-existing trends in teen fertility by locality (which can now be estimated with NIDS) predicts NAFCI clinic placement. Also, I plan to conduct a falsification test to determine if living near clinics that become NAFCI accredited after a respondent turned 18 (and therefore should not have been affected) has an impact on early teen pregnancy. If so, this would imply that there was simply something about different places that got NAFCI clinics rather than that NAFCI itself had an impact.[20]

i. Empirical Specifications

Equation (1) highlights my strategy of measuring impact of adolescent–friendly clinic access in adolescence ($t-1$) on fertility outcomes measured in adulthood (t).

[20] I have a preliminary indication that my research design will pass this type of falsification test. I have found (in results not shown) that redefining the treatment group as 15 to 17 year olds living near NAFCI clinics rather than 12 to 17 year olds leads to larger and substantially more significant estimates. This implies that if I hone in on the age group that is most likely to be affected, the precision is improved and that the estimates shown below are not simply picking up unobserved differences in the types of places that got NAFCI.

$$(1) \qquad Birth\_History_{i,t} = \alpha_0 + Access\_to\_NAFCI_{i,t-1} + \phi' X_{i,t-1} + \delta_j + \epsilon_i$$

Specifically, I estimate a linear probability model by ordinary least squares where the outcome is a binary indicator of having a first birth by age 18. I define NAFCI access with a binary indicator for living (or going to school) within 5 kilometers of a NAFCI clinic any time between age 12 and 17 as in Equation (2)

$$(2) \qquad 1[Birth\ by\ 18]_{i,t} = \alpha_0 + 1[NAFCI\ clinic < 5km]_{i,t-1} + \phi' X_{i,t-1} + \delta_j + \epsilon_i$$

where $X_{i,t-1}$ are demographic characteristics of place of residence at age 15 from the 2001 census, and δ_j are district fixed effects.

I also estimate multinomial logit models where the outcome is fertility timing categorized as 1) no births, 2) first birth by 18 or 3) first birth after 18. This specification allows me to separate out impacts on the timing versus extensive margins.

III. Estimates of the Impact of NAFCI on Teen Fertility

Table 1 compares birth histories for the NIDS sample with and without access to NAFCI-accredited clinics. Of the roughly 2000 women in the sample, 250 lived near a NAFCI clinic in adolescence; and despite the fact that NAFCI clinics were placed in poor communities the prevalence of early teen births is lower among those who lived near a clinic. This result is shown to be marginally significant in the first column of Table 2, which gives estimates of equation (2) without controls or fixed effects. As seen in the second column, the estimated effect of living near a clinic is stronger when I control for demographic characteristics of the locality. This makes sense if clinics that became accredited were on average in poorer, higher teen-pregnancy locations. The estimated 7.7 percentage point drop in the likelihood of having a first birth by age 18 is significant at a 5 percent level. The third column of Table 2 shows that attending a school within 5 km of a NAFCI clinic also reduced likelihood of a birth by 18 by a statistically

significant 10.8 percentage points. Given the mean rates of teen childbearing shown in Table 1, these represent large decreases.

The multinomial logit coefficients shown in Table 3 show a significant reduction in the odds of having a first births by age 18 compared to no births, but a small and insignificant impact on the odds of having a birth *after* 18 compared to no births.[21] These results imply that NAFCI's effect was to delay rather than reduce fertility. Regressions, not shown, estimating the impact of loveLife facilities that only offered the education treatment, but were not linked to a clinic, may allow me to parse out the separate impact of education and clinical access and suggest that the education component alone had a smaller and less significant impact.

IV. Conclusion

I plan to refine the definition of clinic access using more flexible measures of proximity as well as looking for critical ages when access has the most impact (as described in footnote 20). Particularly in the South African context where around 40% of women have a first birth by age 20, it is important to distinguish between early and late teen pregnancies. I consider birth by 18 to be an early teen pregnancy, but I plan to compare my preliminary results to earlier and later cutoffs and continuous measures of age at first birth. NIDS wave 3 recently became available and will allow me to expand the sample of women who had access to NAFCI clinics as the rollout expanded over time.

[21] A negative multinomial logit coefficient implies that living near a clinic reduces the odds of the given outcome relative to the reference category (no births) compared to someone not living near a clinic. A positive coefficient would imply increased odds.

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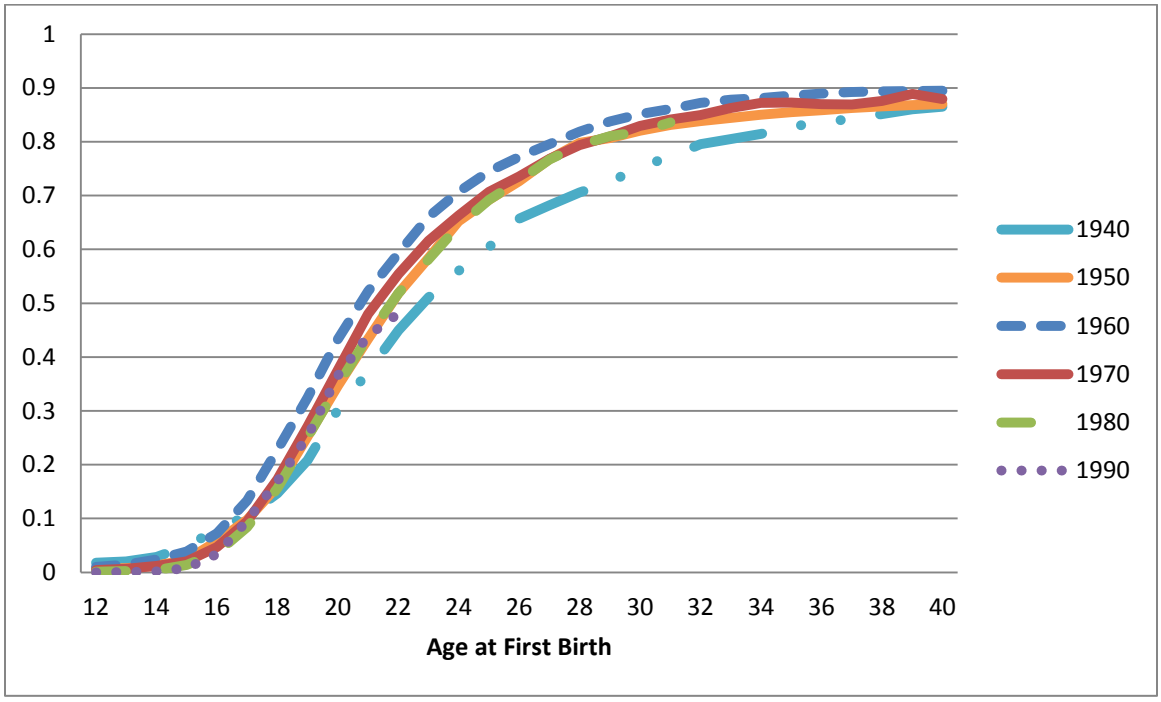
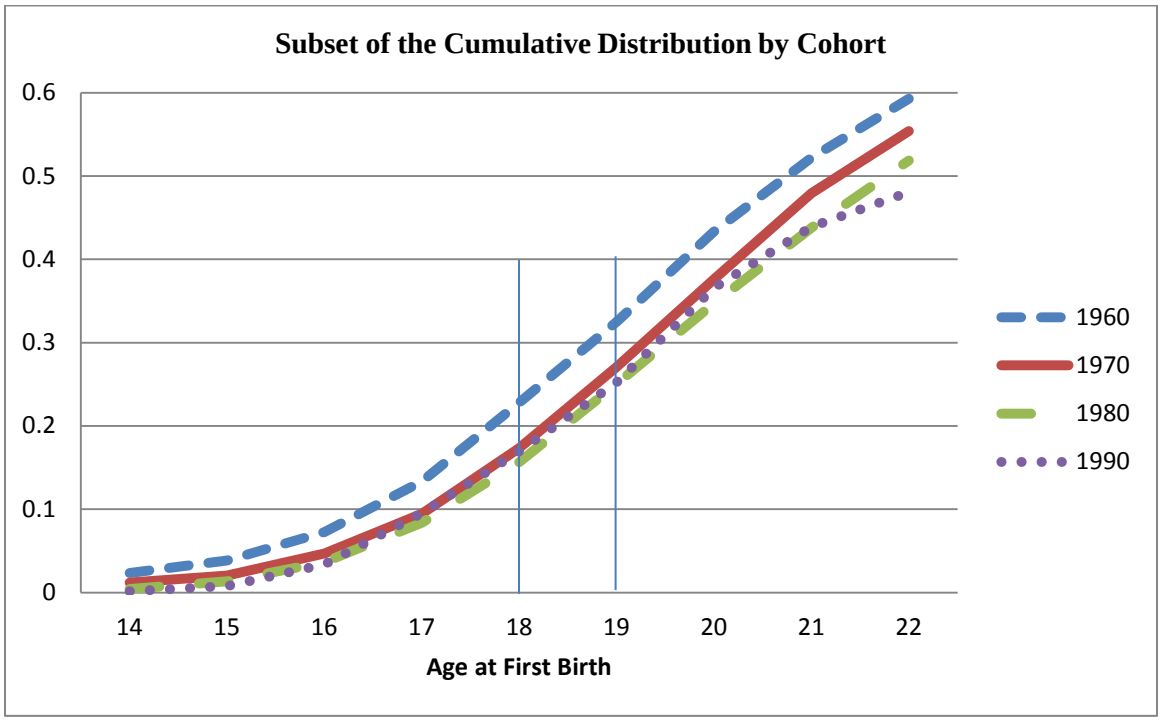
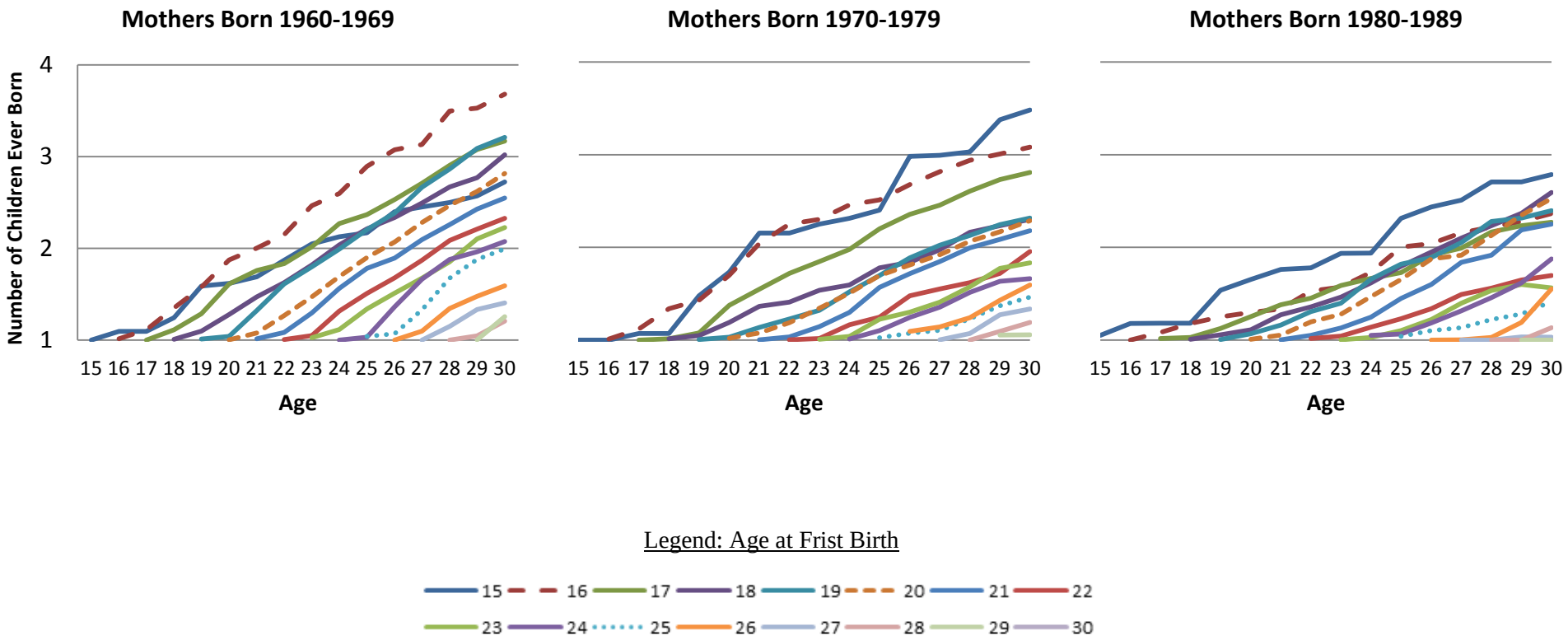
Figure 1. Cumulative Distribution of Age at First Birth by Cohort





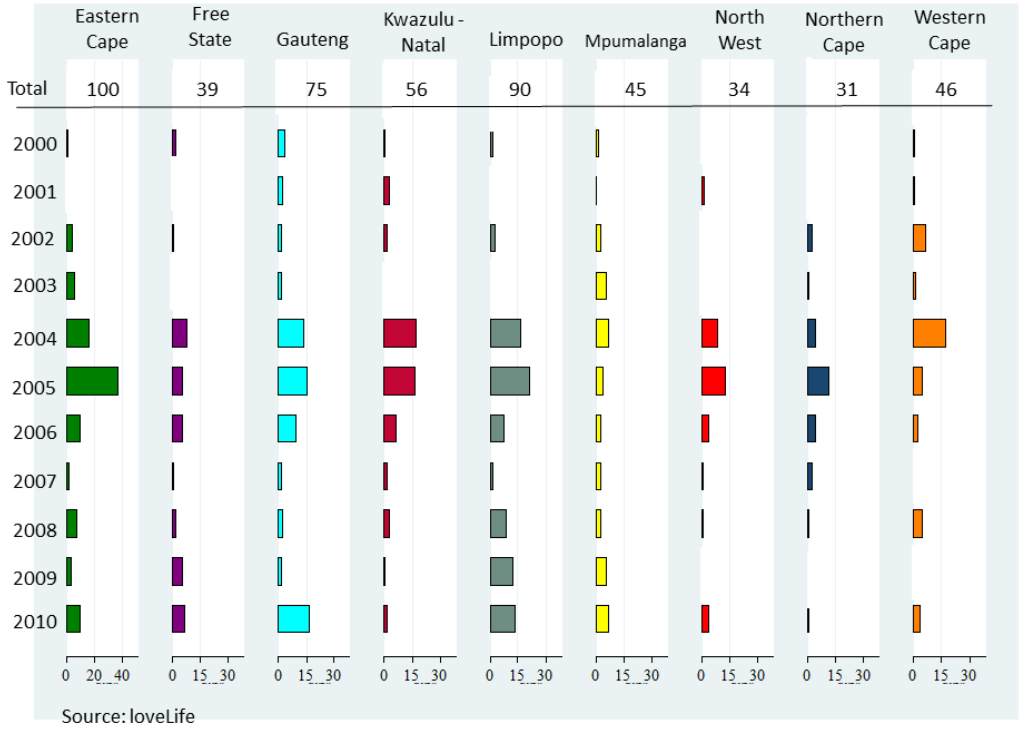
Notes: Author's calculations based on birth histories in the South African National Income Dynamics Study (NIDS).

Figure 2. Children Ever Born by Age at First Birth, across Cohorts



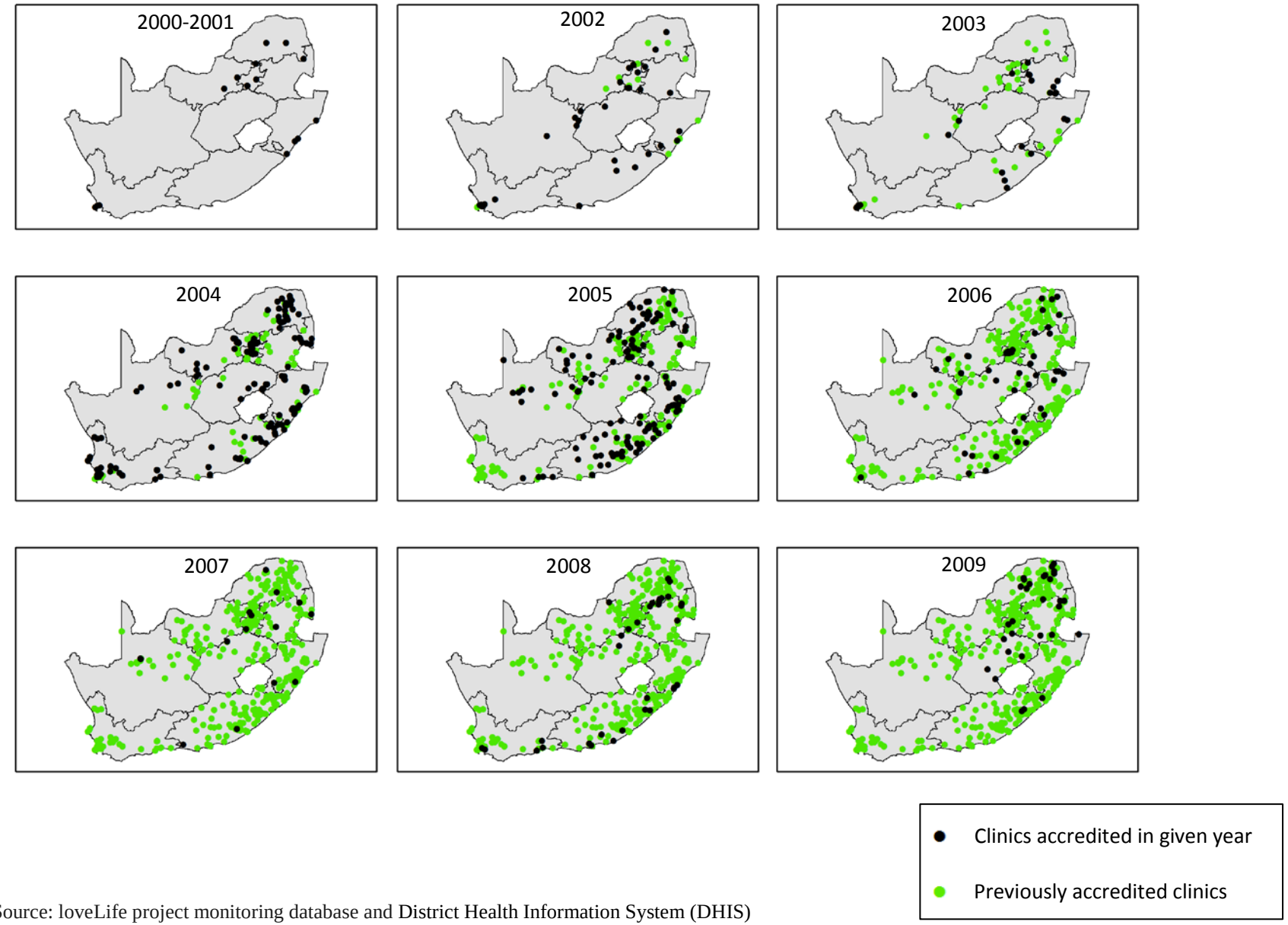
Notes: Author's calculations based on birth histories in the South African National Income Dynamics Study (NIDS).

Figure 3. Rollout of National Adolescent Friendly Clinic Initiative by Year of Accreditation and Province



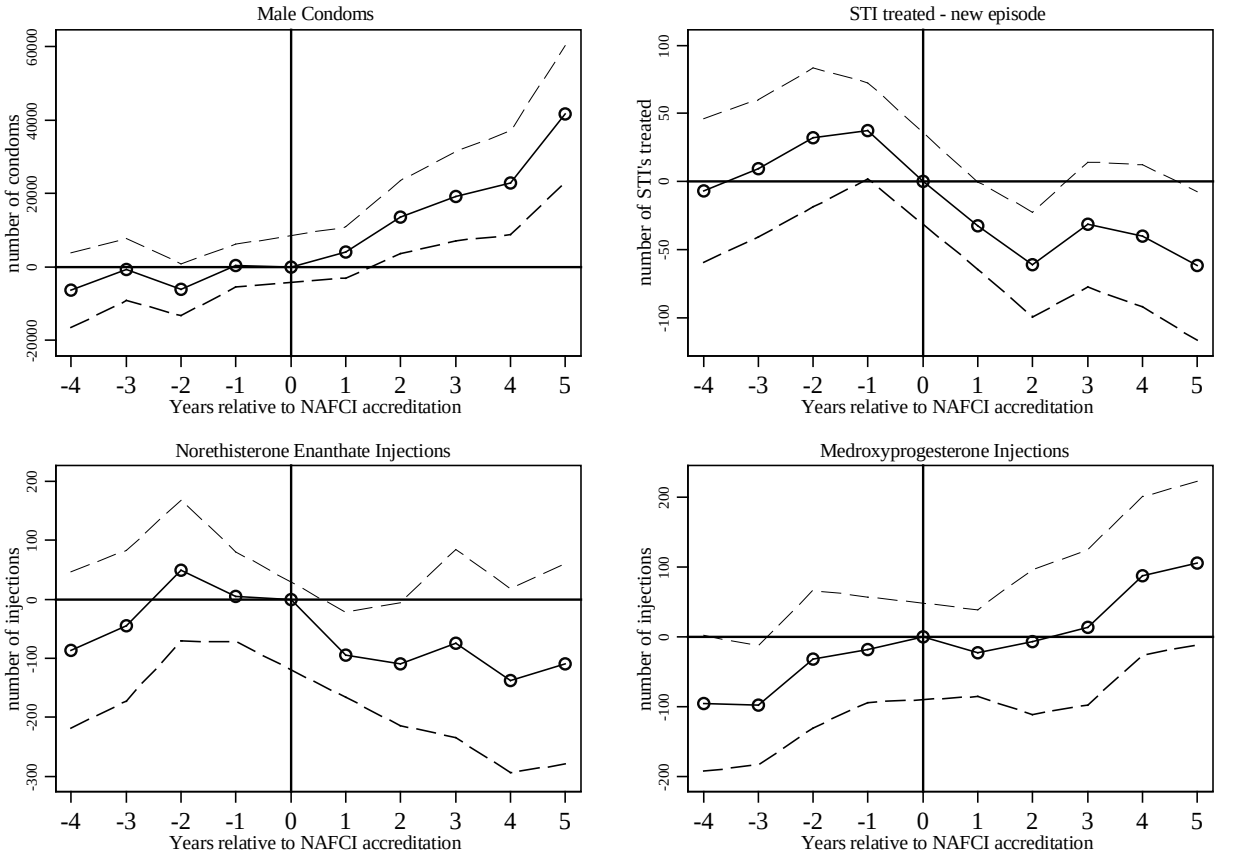
Source: loveLife project monitoring database

Figure 4. Geography and Timing of National Adolescent Friendly Clinic Initiative Rollout



Source: loveLife project monitoring database and District Health Information System (DHIS)

Figure 5. Changes in Reproductive Health Service Provision Relative to Year of NAFCI Clinic Accreditation



Notes: Source: Service provision data from the South African District Health Information System. Information on timing of clinic accreditation form loveLife Project Monitoring Databases. Each plot shows the change in amount of a given service/contraceptive provided at the clinic relative to the level in year zero (one year after the accreditation process started). These estimates control for national trends in service provision by including controls for trends for non-NAFCI accredited clinics and calendar year fixed effects.

Table 1. Women age 19 to 26, by birth category and NAFCI access

	Ever lived within 5km of a YFS clinic when age 12-17?			
	Sample Size		Percentage in each birth category (using NIDS sampling weights)	
	no	yes	no	yes
No Births	717	124	41.41	52.18
Birth by 18	302	46	13.77	9.85
Birth after 18	753	80	44.82	37.97
Total	1772	250		

Notes: Source: Respondents from the South African National Income Dynamics Study Wave 2 geo-linked to NAFCI clinics using data from District Health Information System and loveLife Project Monitoring Databases.

Table 2. Preliminary Results:
Estimated Impact of Access to Youth Friendly Clinics on Likelihood of Birth by Age 18

	Type of Access		
Dependent variable: birth by age 18	Lived Near NAFCI Clinic		School Near NAFCI Clinic
Had Access to Youth Friendly Clinics any time when aged 12-17	-0.039*	-0.077**	-0.108**
	(0.023)	(0.035)	(0.045)
Population group (African omitted)			
Coloured		0.047	0.174*
		(0.047)	(0.090)
White and other		-0.063*	-0.090*
		(0.034)	(0.051)
Age		0.118	0.203
		(0.092)	(0.142)
Age^2		-0.003	-0.005
		(0.002)	(0.003)
Kilometers to any public clinic		-0.002	
		(0.002)	
Main Place controls		yes	yes
District Council fixed effects		yes	yes
Constant	0.138***	-1.201	-2.057
	(0.011)	(1.044)	(1.589)
Observations	2,025	2,009	931
R-squared	0.002	0.063	0.099

Robust standard errors in parentheses
** p<0.05, * p<0.1

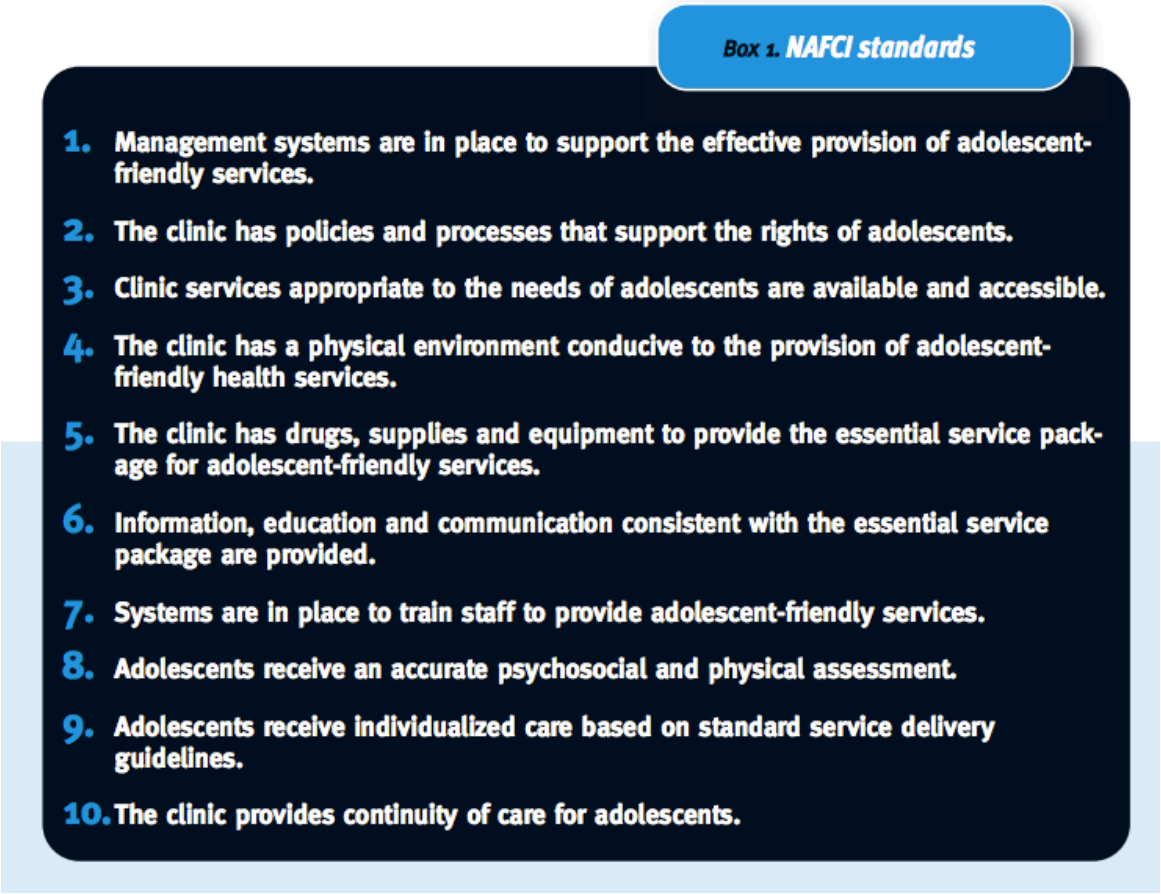
Notes: Source: NIDS wave 2. Sample includes all women age 19 to 26 including women who have not given birth. Being "near" means that the clinic was within 5km of residence or school respectively. Main place is a South Africa Census geographic designation one level below a Municipality. Main Place controls are i) percent of the population 20 and older with less than 12 years of schooling, and ii) rural/urban status. Main place controls are based on the 2001 census and are linked to the respondent's location in 2001 -- prior to roll out of NAFCI. Sample size smaller for school-proximity analysis becuase not all respondents provided information on school attended.

Table 3. Preliminary Results:
Multinomial Logit Estimates of Impact of NAFCI on Fertility Timing

	Odds of Birth Before or After 18 Relative to No Birth	
	Birth by 18	Birth after 18
Lived within 5km of NAFCI clinic	-0.8389**	-0.1145
any time when aged 12-17	(0.3864)	(0.2956)
Age	1.6525	2.3052
	(0.9832)	(0.8389)
Age^2	-0.0327	-0.0423
	(0.0220)	(0.0187)
Population group (African omitted)		
Coloured	0.0165	-0.1940
	(0.4863)	(0.4253)
White and other	-2.7717	-1.1523
	(0.9530)	(0.6160)
Main Place controls	yes	
District Council fixed effects	yes	
Constant	-21.9013	
	(10.9628)	

Notes: Source: NIDS wave 2. Sample includes all women age 19 to 26 including women who have not given birth. Main place is a South Africa Census geographic designation one level below a Municipality. Main Place controls are i) percent of the population 20 and older with less than 12 years of schooling, and ii) rural/urban status. Main place controls are based on the 2001 census and are linked to the respondent's location in 2001 -- prior to roll out of NAFCI.

Exhibit 1. National Adolescent Friendly Clinic Initiative Standards



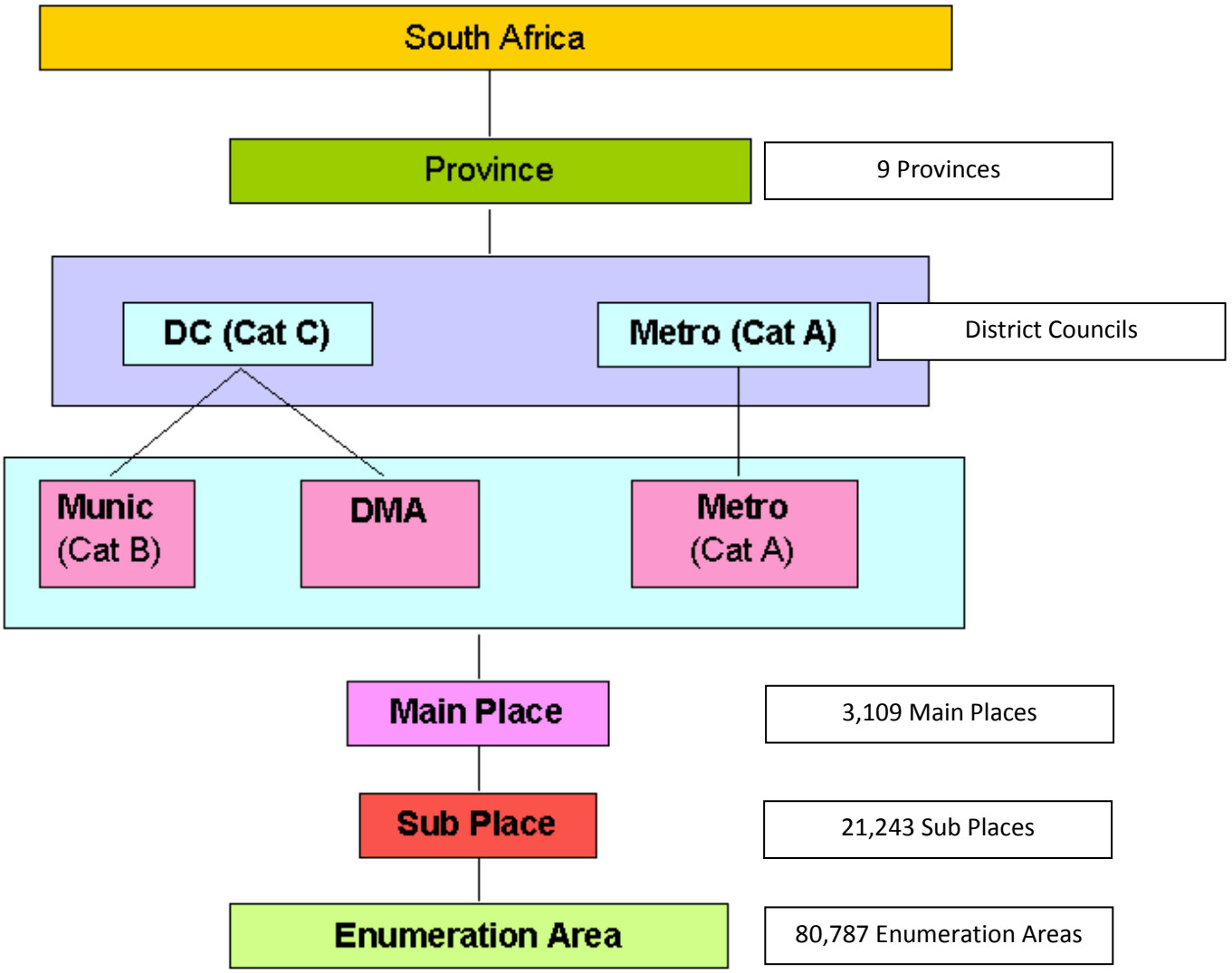
Source: (Ashton, et al., 2009)

Exhibit 2. Youth Friendly Clinic Signage

Exhibit 3. Chillroom, loveLife groundBREAKERS, volunteers, and ClinicHead Nurse.

Source: Author's photographs from site visits to NAFCI clinics

Appendix Figure 1.South African Census 2001 geographical area hierarchy structure



Source: (Statistics South Africa 2001) http://www.statssa.gov.za/census01/html/Geography_Metadata.htm

Appendix Table 1. Correlates of NAFCI Clinic Placement

Dependent Variable: NAFCI Clinic near Residence at age 15-17				
	coefficient	Std. Err.	t	P>|t|
2001 Main Place Controls (Rural omitted)				
Urban	0.2153	(0.0282)	7.64	0.000
Semi/urban	0.1226	(0.0252)	4.86	0.000
Percentage less then 12 yrs	0.0049	(0.0007)	7.04	0.000
District Council fixed effects				
2	0.2380	(0.1165)	2.04	0.041
3	-0.1955	(0.1794)	-1.09	0.276
4	0.2337	(0.1396)	1.67	0.094
5	-0.2074	(0.2635)	-0.79	0.431
6	-0.1822	(0.1905)	-0.96	0.339
7	-0.1171	(0.2760)	-0.42	0.671
8	-0.1023	(0.1678)	-0.61	0.542
9	0.5446	(0.1321)	4.12	0.000
10	0.0994	(0.1343)	0.74	0.46
12	0.0313	(0.1150)	0.27	0.786
13	-0.0655	(0.1185)	-0.55	0.581
14	0.1814	(0.1308)	1.39	0.165
15	-0.1248	(0.1049)	-1.19	0.234
16	-0.1817	(0.1716)	-1.06	0.29
17	-0.0870	(0.1125)	-0.77	0.439
18	-0.1724	(0.1153)	-1.49	0.135
19	-0.1354	(0.1169)	-1.16	0.247
20	-0.1246	(0.1260)	-0.99	0.323
21	-0.0980	(0.1144)	-0.86	0.392
22	0.0423	(0.1109)	0.38	0.703
23	-0.1066	(0.1160)	-0.92	0.358
24	-0.1081	(0.1269)	-0.85	0.394
25	0.2526	(0.1276)	1.98	0.048
26	-0.0928	(0.1162)	-0.8	0.425
27	-0.0998	(0.1207)	-0.83	0.408
28	-0.1039	(0.1187)	-0.88	0.381
29	-0.0699	(0.1252)	-0.56	0.577
30	0.0982	(0.1175)	0.84	0.403
31	-0.0010	(0.1077)	-0.01	0.993
32	0.0523	(0.1092)	0.48	0.632
33	-0.0862	(0.1092)	-0.79	0.43
34	0.0734	(0.1161)	0.63	0.527
35	-0.0433	(0.1063)	-0.41	0.684
36	0.0010	(0.1198)	0.01	0.993
37	0.0382	(0.1120)	0.34	0.733
38	-0.0646	(0.1138)	-0.57	0.571
39	0.0262	(0.1218)	0.22	0.830
40	-0.1023	(0.1455)	-0.7	0.482
42	0.1941	(0.1063)	1.83	0.068
43	-0.1426	(0.1331)	-1.07	0.284
44	-0.1209	(0.1306)	-0.93	0.355
76	0.1374	(0.1059)	1.3	0.195
81	0.1783	(0.1843)	0.97	0.333
82	0.1815	(0.1588)	1.14	0.253
83	-0.0508	(0.1072)	-0.47	0.635
84	0.1010	(0.1138)	0.89	0.375
88	0.3582	(0.1227)	2.92	0.004
171	0.5153	(0.1033)	4.99	0.000
275	0.2626	(0.1086)	2.42	0.016
572	-0.0515	(0.1014)	-0.51	0.611
773	0.3873	(0.1045)	3.71	0.000
774	0.1038	(0.1031)	1.01	0.314
constant	-0.3255146	0.115812	-2.81	0.005
Observations	2030			
R-squared	0.3156			