BIRTH INTERVALS AND INJECTABLE CONTRACEPTION IN SUB-SAHARAN AFRICA

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ABSTRACT

The interval between births is associated with child survival in the developing world. We investigate associations between use of depot medroxyprogesterone acetate and other reversible contraception and short birth intervals in sub-Saharan Africa. Data from successive Demographic and Health Surveys undertaken in nine African countries were analysed. Logistic regression was used to explain changes in the proportion of short birth intervals in four countries with relatively high use of reversible contraception. The overall odds ratio for the trend was 0.90 (95%CI 0.84 to 0.95) and this was unaffected by adjusting for the other variables. The odds of a short birth interval were reduced by exclusive breast feeding (OR 0.67, 95% CI 0.58 to 0.78) and increased by use of injectable contraception (OR 1.23, 95% CI 1.11 to 1.38). The proportion of short birth intervals has changed little over the last decade in a context of very low use of the intrauterine device. Widespread adoption of injectable contraception is associated with greater odds of a short birth interval, thus not contributing favourable conditions for improved child health.

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Birth intervals and injectable contraception in sub-Saharan Africa

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Introduction

The interval between births is associated with child survival in the developing world. Short birth intervals contribute to mortality risk extending beyond the first year of life and the effect is apparent even after taking into account other potential determinants such as maternal ill health or access to health services, and allowing for the uneven quality of data available for use in multivariate analyses (1). Contraceptive use is anticipated to contribute to a reduction in the proportion of short birth intervals but evidence for this at the population level is lacking. Furthermore, while the impact on birth intervals of different reversible contraceptive methods is unknown, depot medroxyprogesterone acetate (DMPA) has gained considerable popularity in sub-Saharan Africa. We aimed to investigate associations between the proportion of short birth intervals and use of this and other reversible contraception in the region.

Methods

Data from successive Demographic and Health Surveys (2) undertaken in nine sub-Saharan African countries were used: Burkina Faso (1992 and 1999), Cameroon (1991 and 1998), Ghana (1993 and 1998), Kenya (1993 and 1998), Madagascar (1992 and 1997), Malawi (1992 and 2000), Niger (1992 and 1998), Tanzania (1992, 1996 and 1999), and Zambia (1992, 1996 and 2001). The percentages of women reporting a preceding birth interval of ≤ or > 24 months were tabulated by country and survey date with the percentages reporting current use of any modern reversible contraception, DMPA and the intrauterine device. As the questionnaire items were very similar across surveys in the different countries it was possible to combine the data sets for further

analysis. Pooled data from the four countries where use of reversible contraception is substantial were used to examine associations among individual women between short birth intervals and demographic and behavioural variables. To allow comparisons over time in the pooled data, a variable was created to identify data from surveys carried out during 1991-1993 and those carried out in 1999-2001. Multiple logistic regression analysis was used to calculate the crude odds ratio of having a birth interval of ≤ 24 months during 1991-3 (reference group) and 1999-2001. We then adjusted for contraceptive choice, breastfeeding practice, mother's age, residence in urban or rural areas, education and household economic status. For the last variable we used principal components analysis to obtain an index from household ownership of certain assets (3). We experimented with interaction terms which proved non-significant.

Results

Table 1 shows that there have been small changes in the percentage of birth intervals ≤ 24 months reported during the five to nine years between first and last surveys in the nine countries, ranging from a decrease of 6.5% (Cameroon and Madagascar) to an increase of 6.4% (Ghana). Over the same period use of modern methods of reversible contraception fell in Burkina Faso (-0.4%) but rose in the other countries with Malawi showing the greatest increase of 15.3%. Use of intrauterine contraception was low in the initial surveys but fell further in all countries. In the four countries with relatively high use of reversible contraception there were significant associations between short birth intervals and a range of variables (Table 2). In multiple logistic regression analysis the overall odds ratio for the trend over time was 0.90 (95%CI 0.84 to 0.95) and this was unaffected

by adjusting for the other variables. The odds of a short birth interval were reduced among those exclusively breast feeding (OR 0.67, 95% CI 0.58 to 0.78) and increased by use of injectable contraception (OR 1.23, 95% CI 1.11 to 1.38) (Table 3).

Discussion

Our results show that use of modern reversible contraception in the region is low, and where use has increased substantially as in Malawi, Tanzania and Zambia this has not been accompanied by any impact on the percentage of short birth intervals. Progress towards attainment of the Millennium Development Goals for child mortality is well behind target in sub-Saharan Africa. This has been ascribed to the presence of civil unrest in some countries and to the burden of the HIV epidemic (4). These risks are magnified by around one fifth of births still occurring at an interval of less than two years, and the data clearly show the very limited progress towards birth spacing in most countries over a decade. Provision of effective reversible contraception is critical in a setting where breastfeeding advice and behaviour are changing through interventions to prevent maternal to child transmission of HIV; breastfeeding duration has long been recognised as the major determinant of birth interval (5) and our findings demonstrate its continued importance. Between the two survey periods the percentage of mothers of children under three who reported no breastfeeding rose slightly from 39% to 44%, perhaps reflecting changing feeding advice in the context of maternal HIV infection.

The proliferation of injectable contraception in Africa may carry some risk to women in a context of high HIV incidence: in cohort studies of commercial sex workers, use of DMPA was associated with both an increased risk of HIV infection (6,7) and a

higher viral load at the time of infection (8). However, in a cohort of women from a general population setting of whom around 15% were DMPA users, no increase in the risk of seroconversion was seen (9) and the excess risk seen among sex workers may reflect other confounding factors. Our findings from the present analysis of sample surveys that are nationally and regionally representative show that the use of injectable contraception is associated adversely with birth interval, thus not contributing any potential child survival benefit. The pathways underlying this statistical association are not clear and require further study. It may even be that women who have experienced an unintended short birth interval are preferentially motivated to use a reliable method such as DMPA. This possibility is however not supported by examination of data from the 2000 DHS Malawi survey, where 49% of women using DMPA reported that their last child had been "wanted then", identical to the response among those using other methods of contraception but fewer than among non-users of contraception (57%). Whatever the nature of the association and notwithstanding its other advantages, it is clear that at the population level DMPA is not providing the anticipated increase in birth interval that would be conducive to bearing and raising healthy children.

Our study highlights the very low and declining use of intrauterine contraception in the region. This decline may have come about through the concern of providers not to recommend a method potentially associated with pelvic infection. International guidelines had restrictive medical eligibility criteria but have recently been revised with regard to advice about STI risk and HIV status (10). Research is needed to assess whether renewed emphasis on the IUD among a broad mix of contraceptive methods has potential to reduce the proportion of short birth intervals in Africa. Finally, it has been recognised

that information provision about condom use as a “routine” method of contraception within stable unions may remove the negative implication of infidelity inseparable from condom promotion for HIV prevention: modelling of the likely impact of condom use supplanting oral contraceptives did not suggest a likely adverse impact on the numbers of unwanted, mistimed, and wanted births (11). Further work is required to obtain direct evidence of the impact of widespread condom use on the proportion of short birth intervals in Africa: such evidence would represent another positive reason for condom use within stable unions.

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Authorship contributions and confirmation

Both authors have access to all data in the study and hold final responsibility for the decision to submit for publication. Both authors designed the study, KNB carried out the analysis and both authors wrote the manuscript.

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Table 1: **Preceding birth interval, Demographic and Health Surveys.**

Country	Year of survey	Birth Interval % (No)		Modern Reversible Contraception		
		≤ 24 months	>24 months	All methods % (No)	Injectables %	IUD %
Burkina Faso	1992	17.6 (821)	82.5 (3858)	6.1 (357)	0.3	1.0
	1999	19 (925)	81 (3946)	5.7 (337)	1.2	0.3
Cameroon	1991	28 (746)	72 (1923)	5.4 (180)	0.5	0.6
	1998	21.5 (377)	78.5 (1380)	6.5 (151)	0.9	0.2
Ghana	1993	14.9 (260)	85.1 (1489)	7.9 (174)	1.1	0.4
	1998	21.3 (705)	78.7 (2605)	11.4 (370)	3.6	0.3
Kenya	1993	30.6 (1494)	69.4 (3383)	20.6 (1257)	7.6	2.2
	1998	26.7 (707)	73.3 (1939)	21.9 (773)	10.5	1.0
Madagascar	1992	35.1 (1461)	64.9 (2706)	4.3 (225)	1.7	0.4
	1997	28.6 (812)	71.4 (2026)	7.5 (275)	4.4	0.2
Malawi	1992	23.9 (871)	76.1 (2781)	7.9 (357)	1.6	0.3
	2000	20.7 (1861)	79.3 (7141)	23.2 (2772)	18.2	0.1
Niger	1992	29.8 (1743)	70.2 (4100)	6.4 (443)	1.5	0.5
	1998	23.6 (920)	76.4 (2981)	7.3 (349)	2.2	0.2
Tanzania	1992	21.3 (1349)	78.7 (4971)	4.9 (402)	5.9	0.3
	1996	20.1 (1066)	79.9 (4250)	14.9 (1009)	7.4	0.4
	1999	21.5 (538)	78.5 (1961)	16.8 (541)	0.2	0.5
Zambia	1992	22.8 (1121)	77.2 (3786)	7.6 (480)	0.2	0.3
	1996	22.9 (1297)	77.1 (4357)	12.5 (906)	0.9	0.1
	2001	19.9 (1065)	80.1 (4282)	18.1 (1241)	4.2	0.03

Table 2: **Short birth interval (<24 months) by selected characteristics, Kenya, Malawi, Tanzania and Zambia. Bivariate analyses of unadjusted data.**

Variable	*%*	*No*	*P>|Z|*
Year (1999-2001)	16.3	25549	0.000
Year (1991-1993)	19.3	25047 reference category	
Urban	15.4	10939	0.000
Rural	18.4	39657 reference category	
No education	18.9	13063	0.000
Primary education	17.7	31124	0.000
Secondary Education and higher	16.0	6407 reference category	
Exclusive breastfeeding	12.6	1753	0.000
Mixed feeding	17.0	24573	0.000
No breastfeeding	18.0	18711 reference category	
Low income households	18.4	17749	0.000
Middle income households	18.8	20768	0.000
High income households	15.2	12079 reference category	
Young mothers (<21 years old)	12.8	13397	0.000
Old mothers (>35 years old)	15.2	5462	0.000
Mothers (> 21 and <35 years old)	20.3	31737 reference category	
No contraception use	17.3	37964	0.000
Using injections	21.7	3612	0.000
Using other methods	18.4	9020 reference category	
Total	17.8	50596	

Table 3: **Adjusted odds ratios for short birth interval (<24 months), Kenya, Malawi, Tanzania and Zambia.**

Variable	*Odds ratio*	*Std. Err*	*95% CI*	*P>|Z|*
Year (1999-2001)	0.90	0.02	0.84, 0.95	0.000
Year (1991-1993)	1	reference category		
Urban	0.85	0.03	0.79, 0.90	0.000
Rural	1	reference category		
No education	1.16	0.05	1.06, 1.26	0.001
Primary education	1.11	0.04	1.03, 1.20	0.009
Secondary Education and higher	1	reference category		
Exclusive breastfeeding	0.67	0.05	0.58, 0.78	0.000
Mixed feeding	0.86	0.02	0.82, 0.90	0.000
No breastfeeding	1	reference category		
Low income households	1.18	0.04	1.10, 1.26	0.000
Middle income households	1.25	0.04	1.17, 1.34	0.000
High income households	1	reference category		
Young mothers (<21 years old)	0.58	0.02	0.55, 0.62	0.000
Old mothers (>35 years old)	0.67	0.03	0.62, 0.72	0.000
Mothers (> 21 and <35 years old)	1	reference category		
No contraception use	0.88	0.03	0.82, 0.93	0.000
Using injections	1.23	0.07	1.10, 1.38	0.000
Using other methods	1	reference category		
Interaction (injection*low income)	1.13	0.10	0.18, 1.35	0.316