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Associations between Women's Current Contraceptive Method Decision Making and their Reproductive Calendar Histories in Burundi

Christina Juan
Courtney Allen
Kerry L. D. MacQuarrie

2020 No. 172

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HEALTH
SURVEYS

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Method Decision Making and their Reproductive Calendar
Histories in Burundi**

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August 2020

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PREFACE

The Demographic and Health Surveys (DHS) Program is one of the principal sources of international data on fertility, family planning, maternal and child health, nutrition, mortality, environmental health, HIV/AIDS, malaria, and provision of health services.

One of the objectives of The DHS Program is to analyze DHS data and provide findings that will be useful to policymakers and program managers in low- and middle-income countries. DHS Working Papers serve this objective by providing in-depth research on a wide range of topics, typically including several countries, and applying multivariate statistical tools and models. These reports are also intended to illustrate research methods and applications of DHS data that may build the capacity of other researchers.

The topics in this series are selected by The DHS Program in consultation with the United States Agency for International Development.

It is hoped that the DHS Working Papers will be useful to researchers, policymakers, and survey specialists, particularly those engaged in work in low- and middle-income countries.

Sunita Kishor
Director, The DHS Program

ABSTRACT

In a recent study of contraceptive calendar data from Demographic and Health Surveys (DHS) in Burundi and Nepal, the researchers created clusters of women based on their contraceptive behavior and pregnancy experiences over a 5-year calendar period (MacQuarrie, Juan, Allen, Zweimueller, and Gemmill 2019). In Burundi, the following six contraceptive clusters were created: Quiet Calendar, Family Builder 1, Family Builder 2, Modern Mother, Consistently Covered Mother, and Traditional Mother.

Here, we carried out multivariable, multinomial logistic regression analysis to examine the associations of these clusters with current decision-making power to use or not use contraception. We also examined how other important factors, including experiences of marital control in terms of suspicion and isolation, intimate partner violence, employment status, fertility intentions, exposure to family planning messages, and family planning discussions with a health provider in a health facility may impact women's current contraceptive decision-making behaviors, after accounting for their 5-year reproductive calendar histories.

We found that women in three of the six clusters—Family Builder 1, Modern Mother, and Consistently Covered Mother—had higher relative risks of deciding jointly whether or not to use contraception with their partners or husbands than of not making a decision about contraception, when compared with women in the Quiet Calendar cluster. Our findings suggest that using clusters based on patterns of key events in a woman's reproductive life gives greater insight into her reproductive journey and into the effects of those patterns on her current ability to make decisions—either jointly or solely—for her health and well-being.

Key words: gender, contraceptive calendar, decision making, longitudinal data, Burundi

ACRONYMS AND ABBREVIATIONS

CI	confidence interval
DHS	Demographic and Health Surveys
IPV	intimate partner violence
LAPM	long-acting or permanent method
PBT	pregnancy, birth, or termination
RR	relative risk
USAID	United States Agency for International Development

1 BACKGROUND

Burundi is a small, landlocked East African country where 77% of the population lives in rural areas. Its total fertility rate of 5.5 is the fourth highest in the world, and modern contraceptive use among all women in the country remains low (15%) (MPBGP et al. 2017). Modern contraceptive methods were not promoted in Burundi until the early 1980s (MPBGP et al. 2017), when the rate of use was less than 1% (Nzokirishaka and Itua 2018). Since then, modern contraceptive prevalence has slowly risen; however, uptake of methods for postpartum family planning still remains very low, and the country's long-standing civil conflict has led to low service utilization (Rutaremwa and Kabagenyi 2018).

Within the field of reproductive health and family planning, particular attention is placed on access to and uptake of modern contraceptive methods. Rutaremwa and Kabagenyi (2018) found that family planning uptake among postpartum women in Burundi increased with education and exposure to media yet was unaffected by wealth, contributing to evidence of strong cultural expectations for women to keep bearing children (Rutaremwa and Kabagenyi 2018). Because there are long-held cultural and social norms around family formation, fertility, and sexual and reproductive health, it is critical to examine women's behavior in navigating these norms, such as through their decision making around these topics. Contraceptive decision making encapsulates behavior beyond modern contraceptive method uptake, such as the decision to use a traditional method or not use a method at all. Women's agency or empowerment is critical for uptake and continued use of contraception in low- and middle-income countries (Bhatti and Jeffery 2012; Santhya et al. 2010), and some studies suggest that women's agency can be a necessary precondition for, or product of, contraceptive use (James-Hawkins et al. 2018). Low past and current rates of contraceptive use are associated with a woman's inferior decision-making power when compared with that of her husband (Hindin 2000), and empowered women are more likely than their less-empowered counterparts to use contraception (OlaOlorun and Hindin 2014).

A woman's agency to use or not use contraception is affected by power dynamics between her and her partner as well as those perpetuated by society. Women may have less autonomy to limit childbearing in a patriarchal society (Bogale et al. 2011; Hogan, Berhanu, and Hailemariam 1999). Some measures of agency, such as women's education and participation in the formal economy, have been linked to lower levels of fertility (Richards and Bass 2019) and reproductive empowerment (Gammage, Joshi, and Rodgers 2020). In Burundi, a husband's leadership role within the family is considered very important, so empowerment for a woman could present itself as the woman and the man making decisions together (Ngenzebuke, De Rock, and Verwimp 2018).

Joint decision making may depend on spousal communication—an important part of family planning interventions. Couples who discuss fertility intentions have greater use of contraception (Bawah 2002; Kulczycki 2008; Yue, O'Donnell, and Sparks 2010). Where couples disagree on fertility preferences or desires, men's power in a relationship may contribute to greater unmet need (Mason and Smith 2000). Despite the influence that partners may have on decisions, women commonly use family planning covertly, indicating that men and women do not always make decisions as a unit; instead, some women make decisions individually (Biddlecom and Fapohunda 1998; Yue, O'Donnell, and Sparks 2010).

A wealth of literature has examined decision making and contraceptive use, and research shows that any level of decision-making power has a positive relationship with contraceptive use. However, capturing agency through decision-making indicators can be context-specific (James-Hawkins et al. 2018; Malhotra and Schuler 2005; Yount et al. 2016), and scholars have not agreed on a defined measurement of agency (Yount et al. 2016). Scant literature has examined women’s response to the question, “*Whose decision is it to (not) use contraception?*” This question is a direct measurement of women’s perceived agency to use or not use contraception, and we focused on this question in our analysis.

Reproductive health and family planning health providers serve adolescent girls and women in all stages of their reproductive journeys, from around the time of menarche through menopause. However, current evidence, policies, and programming inadequately capture the nuances of a woman’s reproductive health and family planning journey. This is because insights often rely on cross-sectional data, which create a snapshot of needs at a specific moment of time without fully accounting for changes in those needs.

Because of the limitations of the cross-sectional nature of Demographic and Health Surveys (DHS) data, we examined 5-year retrospective contraceptive calendars found in some DHS surveys that capture contraceptive and pregnancy events. A recent study used these calendar data from the 2016-17 Burundi DHS to cluster women based on the sequences of their reproductive experiences (MacQuarrie, Juan, Allen, Zweimueller, and Gemmill 2019). These dynamic clusters represented the most common sequences that women of reproductive age in Burundi may experience, offering rich insight into their unique reproductive journeys. Using these clusters, it also became possible to analyze a woman’s perceived agency to use or not use contraception with a lens of women’s journeys to their present state.

This study examined whether the contraceptive decision making of women in Burundi was associated with distinct patterns in their contraceptive and pregnancy histories and in their experiences with intimate partner violence (IPV). This was accomplished using a specific measure of decision making and the distinct clusters identified from the study of 5-year retrospective calendars capturing reproductive events—an innovative application of these data (MacQuarrie, Juan, Allen, Zweimueller, and Gemmill 2019). The results of this study contribute to our understanding of contraceptive behavior and women’s agency, and examines whether retrospective contraceptive calendar data is predictive of decision making.

2 DATA AND METHODS

2.1 Data

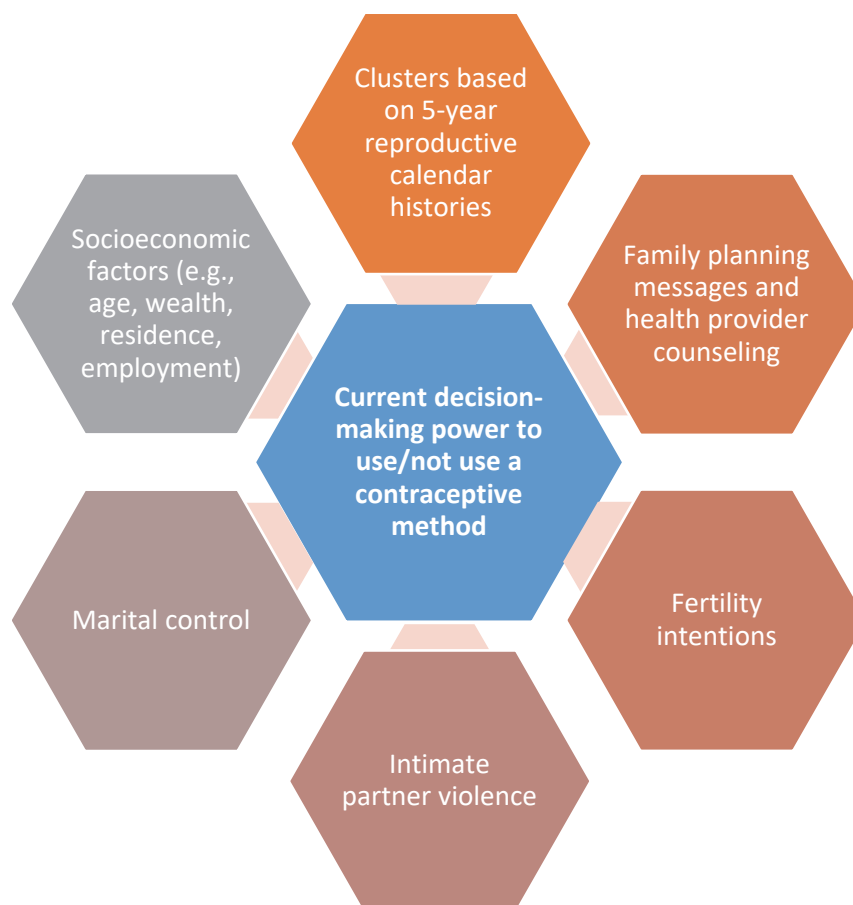
This study used data from the 2016-17 Burundi DHS survey—a nationally representative, household survey of 17,269 women age 15-49 and 7,552 men age 15-59. The DHS survey included data on a wide range of sexual and reproductive health, population, maternal and child health, and nutrition indicators collected by ICF International in collaboration with the Burundi government and seven other organizations. We selected this country for our analysis to gain further understanding of the six contraceptive clusters that were analyzed in the study by MacQuarrie et al. (2019).

A total of 5,388 women were chosen for our study. To reach this sample size, we first restricted our analysis to women who had both completed the DHS survey and were included in the recent study in which the six contraceptive clusters were created based on 59 months of data ($n = 13,184$) (MacQuarrie, Juan, Allen, Zweimueller, and Gemmill 2019). MacQuarrie et al. (2019) omitted the most recent 3 months of data as some events may not become known by the respondent (e.g., a pregnancy) and reported as a result; additionally, the authors excluded women who were younger than age 15 at the start of their 5-year retrospective contraceptive calendar, because adolescent girls and young women are generally neither sexually active nor biologically fecund during the period of their 5-year calendar histories (MacQuarrie, Mallick, and Allen 2017). We further restricted our sample to women who were currently married or in a union who reported not being pregnant at the time of the survey. Because of their pregnancy status, these women were not asked about their decision-making power to use or not use contraception. Women who were not currently married or in a union were not asked the questions about marital control that were pertinent to our conceptual framework. Lastly, we restricted our analysis to the subpopulation of women who were also selected to participate in the domestic violence module of the survey.

Conceptual Framework

We developed a conceptual framework (Figure 1) to inform our analysis.

Figure 1 Conceptual framework



We hypothesized that a woman’s membership in a cluster (based on her 5-year calendar history of experiences related to births, pregnancies, terminations, contraceptive method use, and method type) impacts her current capacity to make or participate in decisions related to contraception. We investigated these relationships, accounting for socioeconomic factors such as current employment status. We further hypothesized that experiences of marital control and IPV impact a woman’s ability to decide whether or not to use contraception, so we accounted for these covariates. Women who experience IPV and marital control would signal a lower risk of feeling empowered to decide whether or not to use a contraceptive method, for instance. Lastly, we controlled for other variables that could affect decision making, including fertility intentions, exposure to family planning messages, and family planning counseling discussions with a health provider. Women who access the health system more frequently and have greater exposure to family planning messages feel more empowered to decide whether or not to use a contraceptive method.

2.2 Methods

2.2.1 Contraceptive calendar data and clusters

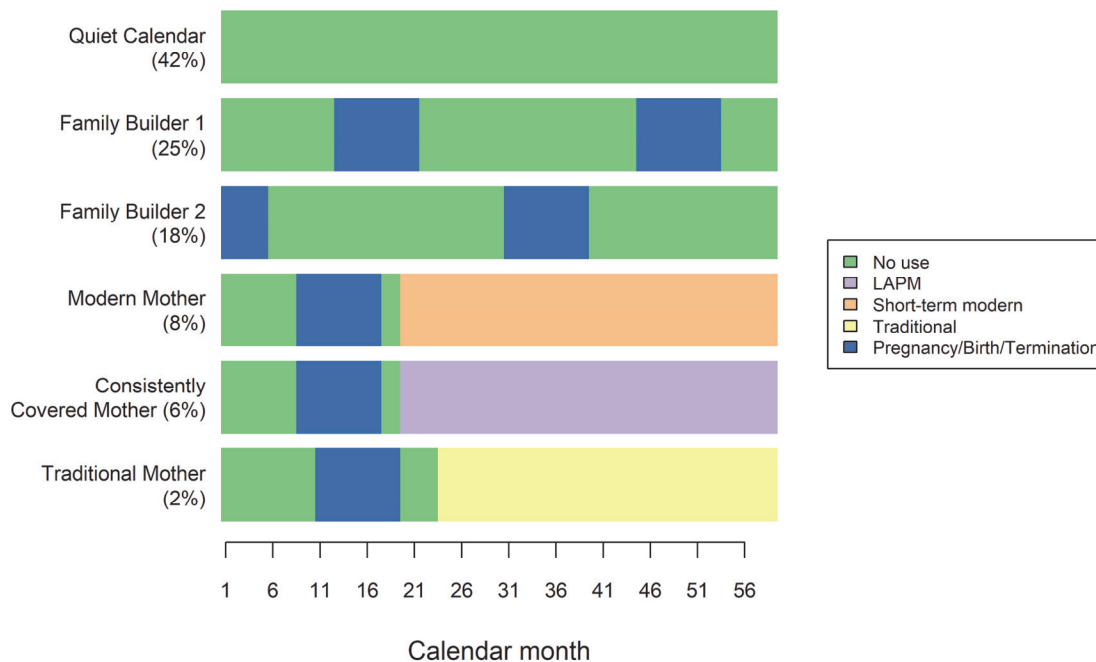
The analysis uses variables from a previous study that examined contraceptive calendar data to create clusters, also referred to as contraceptive profiles in the previous study (MacQuarrie, Juan, Allen, Zweimueller, and Gemmill 2019). For this study, we will refer to these contraceptive profiles as *clusters*. The DHS contraceptive calendar is a month-by-month history of life events in terms of births, pregnancies,

terminations, contraceptive use, and other experiences pertaining to reproductive and sexual outcomes. The calendar provides information related to the year of the survey plus the five full calendar years preceding the survey. To produce the six primary clusters, sequence and cluster analysis of the analytical sample was carried out using the TraMineR and WeightedCluster packages in R (Gabadinho et al. 2011; Studer 2013). For instance, Optimal matching, a sequence analysis method, was used to account for the timing of pregnancies and births in the sequences. The cluster analysis also helped to group women in the sample together based on similar sexual and reproductive health events they experienced during the contraceptive calendar. These events were grouped into five states: 1) no contraceptive use; 2) traditional method use; 3) short-term modern method use; 4) use of a long-acting or permanent method (LAPM); and 5) pregnancy, birth, or termination (PBT).

For context and because our analysis built upon the results of the study by MacQuarrie et al. (2019), Figure 2 shows how the population of that study was distributed across the six contraceptive clusters based on 59 months of calendar data: Quiet Calendar, Family Builder 1, Family Builder 2, Modern Mother, Consistently Covered Mother, and Traditional Mother. This figure shows six medoids, or representative sequences, that correspond to each contraceptive cluster. As these clusters were created using the 5-year contraceptive calendar data, each medoid represents 5 years of data; each color indicates a state within that representative sequence.

Women in the Quiet Calendar cluster (42% of the analytical sample) were characterized by their nonuse of contraception over their 59-month calendar sequences. Family Builder 1 was the second largest cluster, representing a quarter of women. In this cluster, women were characterized by experiencing two distinct PBT states (as indicated in blue) among states of contraceptive nonuse (indicated in green) over the 5-year reporting period. The next most common sequence was within the Family Builder 2 cluster (18%). Family Builder 1 and Family Builder 2 differed in that women within the Family Builder 1 cluster reported a contraceptive nonuse state 5 years before the survey, followed by a PBT state, and the women in the Family Builder 2 cluster reported the opposite (a PBT state followed by a nonuse state). The Modern Mother cluster (8% of the sample) was characterized by women who eventually used a short-term modern contraceptive method after experiences of nonuse and PBT. Lastly, 8% of women in the sample belonged to the Consistently Covered Mother (6%) and Traditional Mother (2%) clusters, which were characterized by LAPM and traditional method use, respectively, after experiences of nonuse and PBT.

Figure 2 Representative sequences within each Burundi cluster



Note: LAPM: long-acting or permanent method

Although the contraceptive clusters offer insight into the most typical patterns of events women experience in Burundi, we understand that they are only representative sequences; consequently, we understand that women assigned to the medoids displayed in Figure 2 also experience other states of contraceptive behavior and pregnancy-related episodes that are more diverse and nuanced. As such, the appendix shows sequence index plots, illustrating the diversity of experiences in each cluster. The sequence index plots, to be interpreted as women’s 5-year event calendars horizontally, exhibit the variation of states and sequences that occur at an individual level. Some women in the Quiet Calendar cluster, for example, experienced the PBT state, although this was not the main pattern across the women in this cluster.

2.2.2 Decision-making indicators and covariates

To create a measure of decision-making power to use or not use contraception, we created an indicator that describes whether a woman has no, sole, or joint—with her partner or husband—decision-making power—a three-category variable. In our analysis, this variable served as our outcome variable of interest. A woman was considered to have any contraceptive decision-making power if she reported either solely or jointly deciding to use or not use contraception. This variable was constructed based on two separate survey questions regarding who the decision maker is for using or not using contraception, depending on whether the respondent was using contraception. Possible responses were 1) mainly the respondent, 2) mainly the husband or partner, 3) the respondent and husband/partner jointly, and 4) other.

We reflected on our conceptual framework (Figure 1) and conducted bivariate and multinomial logistic regression analysis to examine the associations among our three-category outcome of interest (on decision making) and the six clusters (Quiet Calendar, Family Builder 1, Family Builder 2, Modern Mother, Consistently Covered Mother, and Traditional Mother)—our main exposure variable.

We controlled for demographic and socioeconomic factors, fertility, and family planning using the following covariates: age, education, current work status, wealth, residence, region, fertility intentions, exposure to family planning messages, and whether the woman had discussed family planning with a health provider. To examine fertility intentions, we created a binary variable by grouping women into two categories: “no” if they stated clearly that they either did not want children or were unable to have children (i.e., they were infecund), and “yes” if they wanted children or were undecided. The undecided women were included in the “yes” category, assuming that some of these women would eventually decide they wanted children.

We also examined experiences of marital control and IPV. Regarding marital control, we created two separate indicators to examine whether a woman’s partner or husband was suspicious or isolating. Items were categorized as 1) *suspicious* if the husband or partner was jealous, accused the respondent of being unfaithful, or insisted on knowing where the respondent was at all times. They were categorized as *isolating* if the husband or partner did not permit the respondent to meet her female friends or tried to limit the respondent’s contact with family. Using data from numerous DHS surveys in sub-Saharan Africa, previous research on IPV and marital control using factor analysis identified that specific items pointed to spousal violence (i.e., IPV) perpetrated against married and in-union women by their husbands or cohabitating partners (MacQuarrie, Winter, and Kishor 2014). In terms of IPV, we also included an indicator regarding sexual violence and another one to examine experiences of emotional violence, which we defined as respondents who had been humiliated, threatened with harm, or insulted or made to feel bad by their partners or husbands. For marital control and IPV indicators, respondents who were married or in a union as well as those who had participated in the domestic violence module of the DHS survey were part of this subsample.

Table 1 lists the indicators and the corresponding definitions used to calculate them for this study.

Table 1 Marital control, fertility, and family planning covariates

Indicator	Definition
Marital control and violence	
Emotional violence experienced	Whether respondent experienced emotional violence by husband/partner in the past 12 months
Sexual violence experienced	Whether respondent experienced sexual violence by husband/partner in the past 12 months
Marital suspicion experienced	Whether respondent ever experienced any of the following types of marital control exercised by husband or partner: 1) the partner was jealous, 2) the partner accused respondent of being unfaithful, or 3) the partner insisted on knowing where the respondent was at all times.
Marital isolation experienced	Whether respondent ever experienced any of the following types of marital suspicion exercised by husband or partner: 1) the partner did not permit respondent to meet female friends, or 2) the partner tried to limit respondent’s contact with family
Fertility	
Fertility intentions	Women who wanted children or were undecided versus those who did not want children or were infecund
Family planning	
Current contraceptive method use	Modern or traditional contraceptive method use
Exposure to family planning messages	Exposure to family planning messages in the past few months (e.g., through radio, TV, newspaper/magazine)
Discussed family planning use	Whether the respondent visited a health facility and was told about family planning by a health provider in the past 12 months

2.2.3 Analyses

We carried out bivariable statistical analyses using chi-square tests and fitted multinomial logistic regression to model the trichotomous outcome variable of jointly, solely, or not deciding whether to use or not use contraception. Our statistical analyses accounted for complex survey design using the `svy` command in Stata/MP16.0 and the weights from the domestic violence module were used. All statistics presented are weighted. Sensitivity analysis was carried out with regression models among the subgroup of women who decided to use a contraceptive method and the subgroup who decided not to use a contraceptive method, separately, compared with our main outcome variable of interest on contraceptive decision making.

3 RESULTS

Table 2 presents sample descriptive statistics for the women in our study. The distribution of contraceptive clusters corresponded to that in the study by MacQuarrie et al. (2019); the majority of women belonged to the Family Builder 1 cluster, followed by the Quiet Calendar cluster, with the lowest proportion of women in the Traditional Mother cluster. The majority of women (88%) reported currently working, and 90% of the women lived in rural areas in Burundi. Half of the sample was not educated, and nearly 40% had completed primary education.

Table 2 Profile of analytical sample of women, Burundi DHS 2016-17

Characteristic	N (weighted)	%
Cluster		
Family Builder 1	1,493	31.9
Family Builder 2	981	21.0
Traditional Mother	141	3.0
Modern Mother	480	10.3
Quiet Calendar	1,238	26.5
Consistently Covered Mother	343	7.3
Age group		
20-24	689	14.7
25-29	1,073	22.9
30-34	1,016	21.7
35-39	821	17.6
40-44	604	12.9
45-49	474	10.1
Highest education		
None	2,346	50.2
Primary	1,817	38.9
Secondary or higher	513	11.0
Work status		
Currently not working	579	12.4
Currently working	4,098	87.6
Wealth		
Lowest	952	20.4
Second	1,001	21.4
Middle	932	19.9
Fourth	916	19.6
Highest	876	18.7
Residence		
Urban	470	10.1
Rural	4,206	89.9

Continued...

Table 2—Continued

Characteristic	N (weighted)	%
Region		
Bubanza	237	5.1
Bujumbura Rural	253	5.4
Bururi	128	2.7
Cankuzo	142	3.0
Cibitoke	250	5.4
Gitega	387	8.3
Karusi	277	5.9
Kayanza	310	6.6
Kirundo	354	7.6
Makamba	280	6.0
Muramvya	179	3.8
Muyinga	360	7.7
Mwaro	160	3.4
Ngozi	440	9.4
Rutana	198	4.2
Ruyigi	239	5.1
Bujumbura Mairie	250	5.3
Rumonge	231	4.9
Decision-making power to use or not use contraception		
None	522	11.2
Sole	1,071	22.9
Joint	3,083	65.9
Ever experienced emotional violence by partner or husband		
No	3,606	77.1
Yes	1,070	22.9
Ever experienced sexual violence by partner or husband		
No	3,530	75.5
Yes	1,146	24.5
Marital suspicion		
No	3,312	70.8
Yes	1,364	29.2
Marital isolation		
No	4,006	85.7
Yes	670	14.3
Desire more children		
No or infecund	2,270	48.5
Yes or unsure	2,406	51.5
Current contraceptive method use		
Not using	3,163	67.6
Modern method	1,218	26.1
Traditional method	295	6.3
Exposure to family planning messages		
No	3,232	69.1
Yes	1,445	30.9
Discussed family planning with health worker		
No	2,882	61.6
Yes	1,794	38.4
Total	4,676	100.0

Table 3 displays associations among the clusters, covariates, and decision-making power to use or not use contraception, based on results of bivariate analysis. Across all clusters, joint decision making was more common than sole or no decision making to use or not use contraception. For instance, there is strong

statistical evidence that more women in the Family Builder 1 cluster made decisions jointly than made sole decisions about whether to use or not use contraception (68% versus 22%; $p<0.001$).

Results also showed that a significantly higher proportion of both women who had ever experienced emotional violence and women who had ever experienced sexual violence by their partners or husbands decided jointly to use a form of contraception, and that there was strong statistical evidence of an association between these forms of violence and current contraceptive decision making ($p<0.001$ for both). The same was true for women who experienced marital suspicion and those who experienced marital isolation, with strong evidence an association between these forms of marital control and current contraceptive decision making ($p<0.001$ for both). Among women who reported current method use, there was strong statistical evidence of an association between current method use and current contraceptive decision making where 88% who were using traditional methods and 82% who were using modern methods reported joint decision making over sole or no decision making ($p<0.001$ for both).

Table 3 Bivariate results of associations among clusters, covariates, and decision-making power to use or not use contraception, Burundi DHS 2016-17

Characteristic	Decision-making power to use or not use contraception					p ¹
	None	Sole	Joint	Total		
	%	%	%	%	Weighted n	
Cluster						
Family Builder 1	10.1	21.9	68.0	100.0	1,493	
Family Builder 2	13.5	25.8	60.7	100.0	981	
Traditional Mother	7.2	6.8	85.9	100.0	141	***
Modern Mother	4.1	16.2	79.7	100.0	480	
Quiet Calendar	15.5	28.2	56.3	100.0	1,238	
Consistently Covered Mother	5.2	15.5	79.3	100.0	343	
<i>Marital control and violence</i>						
Ever experienced emotional violence by partner or husband						
No	11.2	20.5	68.3	100.0	3,606	***
Yes	11.0	31.0	58.0	100.0	1,070	
Ever experienced sexual violence by partner or husband						
No	10.8	21.1	68.1	100.0	3,530	***
Yes	12.2	28.5	59.2	100.0	1,146	
Marital suspicion						
No	10.7	20.4	68.9	100.0	3,312	***
Yes	12.3	28.9	58.8	100.0	1,364	
Marital isolation						
No	11.0	21.7	67.3	100.0	4,006	***
Yes	12.4	29.9	57.7	100.0	670	
<i>Fertility</i>						
Desire more children						
No or infecund	11.5	25.5	63.0	100.0	2,270	**
Yes or unsure	10.9	20.4	68.7	100.0	2,406	
<i>Family planning</i>						
Current method use						
Not using	14.0	28.3	57.7	100.0	3,163	
Modern method	4.7	13.3	82.0	100.0	1,218	***
Traditional method	6.8	4.9	88.3	100.0	295	
Exposure to family planning messages						
No	11.5	25.6	63.0	100.0	3,232	***
Yes	10.5	16.9	72.6	100.0	1,445	

Continued...

Table 3—Continued

Characteristic	Decision-making power to use or not use contraception				Weighted n	p ¹
	None	Sole	Joint	Total		
	%	%	%	%		
Discussed family planning with health worker						
No	11.3	23.0	65.7	100.0	2,882	
Yes	11.0	22.8	66.3	100.0	1,794	0.94
Age						
20-24	11.4	19.3	69.3	100.0	689	
25-29	10.2	21.2	68.6	100.0	1,073	
30-34	9.3	23.5	67.2	100.0	1,016	**
35-39	12.0	21.9	66.1	100.0	821	
40-44	14.4	26.6	59.0	100.0	604	
45-49	11.3	27.8	60.9	100.0	474	
Highest education						
None	11.9	26.6	61.5	100.0	2,346	
Primary	10.7	20.5	68.8	100.0	1,817	***
Secondary or higher	9.2	14.5	76.3	100.0	513	
Work status						
Currently not working	16.6	17.4	66.0	100.0	579	***
Currently working	10.4	23.7	65.9	100.0	4,098	
Wealth						
Lowest	11.1	30.4	58.6	100.0	952	
Second	10.9	24.1	65.0	100.0	1,001	
Middle	12.1	20.4	67.4	100.0	932	***
Fourth	12.6	19.6	67.8	100.0	916	
Highest	9.0	19.4	71.6	100.0	876	
Residence						
Urban	8.9	19.6	71.5	100.0	470	
Rural	11.4	23.3	65.3	100.0	4,206	0.05
Region						
Bubanza	17.9	21.8	60.3	100.0	237	
Bujumbura Rural	13.6	18.2	68.1	100.0	253	
Bururi	30.4	23.8	45.8	100.0	128	
Cankuzo	6.4	16.8	76.8	100.0	142	
Cibitoke	14.3	22.1	63.6	100.0	250	
Gitega	14.3	17.1	68.6	100.0	387	
Karusi	9.1	31.4	59.5	100.0	277	
Kayanza	1.9	29.8	68.3	100.0	310	
Kirundo	9.4	25.0	65.6	100.0	354	***
Makamba	6.8	15.0	78.2	100.0	280	
Muramvya	5.3	18.4	76.2	100.0	179	
Muyinga	15.1	27.4	57.4	100.0	360	
Mwaro	13.8	26.5	59.7	100.0	160	
Ngozi	2.5	29.9	67.6	100.0	440	
Rutana	14.3	21.7	64.0	100.0	198	
Ruyigi	19.8	7.0	73.2	100.0	239	
Bujumbura Mairie	8.8	20.8	70.5	100.0	250	
Rumonge	11.8	30.5	57.7	100.0	231	
Total (weighted N)					4,676	

Notes:
¹ p-value indicates statistical strength of the association with the covariate.
 *p<0.05; **p<0.01; ***p<0.001

Results of multivariable multinomial logistic regression for decision-making ability to use or not use contraception are displayed in Table 4. The analysis compared women who reported sole decision making with those who did not make a decision, and women who reported joint decision making with those who did not make a decision. Results are presented as relative risks (RRs).

Table 4 Adjusted relative risks from multivariable multinomial logistic regression examining clusters and decision-making power to use or not use contraception, Burundi DHS 2016-17

Characteristic	Decision-making power to use or not use contraception			
	Sole vs. none		Joint vs. none	
	RR ¹	[95% CI]	RR ¹	[95% CI]
Cluster				
Quiet Calendar (ref)				
Family Builder 1	1.24	[0.89 - 1.73]	1.56**	[1.17 - 2.08]
Family Builder 2	1.10	[0.78 - 1.54]	1.20	[0.88 - 1.64]
Traditional Mother	1.24	[0.43 - 3.58]	1.61	[0.69 - 3.75]
Modern Mother	1.53	[0.83 - 2.81]	2.26**	[1.33 - 3.84]
Consistently Covered Mother	1.36	[0.72 - 2.55]	2.14**	[1.31 - 3.49]
Ever experienced emotional violence by partner or husband				
No (ref)				
Yes	1.26	[0.91 - 1.75]	0.85	[0.64 - 1.13]
Ever experienced sexual violence by partner or husband				
No (ref)				
Yes	1.10	[0.81 - 1.51]	0.82	[0.62 - 1.09]
Marital suspicion				
No (ref)				
Yes	1.07	[0.78 - 1.47]	0.74*	[0.56 - 0.98]
Marital isolation				
No (ref)				
Yes	1.02	[0.70 - 1.48]	1.00	[0.71 - 1.42]
Desire more children				
No or infecund (ref)				
Yes or unsure	0.86	[0.65 - 1.14]	1.18	[0.93 - 1.48]
Current contraceptive method use				
None (ref)				
Modern	0.93	[0.63 - 1.37]	2.90***	[2.07 - 4.06]
Traditional	0.33**	[0.14 - 0.76]	2.66**	[1.48 - 4.78]
Exposure to family planning messages				
No (ref)				
Yes	0.73*	[0.54 - 0.98]	1.06	[0.81 - 1.37]
Discussed family planning with a health worker				
No (ref)				
Yes	1.05	[0.81 - 1.37]	1.00	[0.80 - 1.26]
Age				
20-24 (ref)				
25-29	0.70	[0.40 - 1.24]	0.66	[0.40 - 1.07]
30-34	0.83	[0.49 - 1.39]	0.70	[0.44 - 1.10]
35-39	0.98	[0.59 - 1.62]	0.77	[0.50 - 1.20]
40-44	0.67	[0.41 - 1.10]	0.62*	[0.40 - 0.96]
45-49	0.69	[0.40 - 1.21]	0.55*	[0.34 - 0.90]
Highest education				
None (ref)				
Primary	0.97	[0.74 - 1.27]	1.15	[0.90 - 1.46]
Secondary or higher	0.70	[0.42 - 1.18]	1.16	[0.75 - 1.77]
Work status				
Currently not working (ref)				
Currently working	1.98***	[1.37 - 2.85]	1.68**	[1.20 - 2.37]

Continued...

Table 4—Continued

Characteristic	Decision-making power to use or not use contraception			
	Sole vs. none		Joint vs. none	
	RR ¹	[95% CI]	RR ¹	[95% CI]
Wealth				
Lowest (ref)				
Second	0.94	[0.66 – 1.35]	1.13	[0.82 – 1.56]
Middle	0.77	[0.54 – 1.10]	1.03	[0.75 – 1.41]
Fourth	0.75	[0.53 – 1.05]	1.01	[0.73 – 1.40]
Highest	1.36	[0.85 – 2.17]	1.39	[0.90 – 2.15]
Residence				
Urban (ref)				
Rural	1.16	[0.65 – 2.06]	1.00	[0.61 – 1.65]
Region				
Bubanza (ref)				
Bujumbura Rural	1.27	[0.53 – 3.05]	1.48	[0.70 – 3.12]
Bururi	0.72	[0.29 – 1.77]	0.47	[0.22 – 1.01]
Cankuzo	1.88	[0.88 – 4.00]	3.41***	[1.84 – 6.32]
Cibitoke	1.31	[0.60 – 2.83]	1.47	[0.71 – 3.04]
Gitega	1.01	[0.44 – 2.31]	1.35	[0.68 – 2.68]
Karusa	2.69*	[1.23 – 5.86]	1.54	[0.74 – 3.23]
Kayanza	11.97***	[4.78 – 29.96]	7.76***	[3.09 – 19.52]
Kirundo	1.89	[0.91 – 3.95]	1.98*	[1.09 – 3.62]
Makamba	2.01	[0.69 – 5.86]	3.60**	[1.38 – 9.41]
Muramvya	2.82*	[1.15 – 6.89]	3.65**	[1.57 – 8.46]
Muyinga	1.48	[0.76 – 2.85]	0.96	[0.53 – 1.73]
Mwaro	1.64	[0.75 – 3.57]	1.19	[0.59 – 2.41]
Ngozi	10.48***	[4.47 – 24.55]	6.28***	[2.86 – 13.78]
Rutana	1.20	[0.60 – 2.40]	1.19	[0.63 – 2.24]
Ruyigi	0.33**	[0.14 – 0.75]	1.19	[0.66 – 2.15]
Bujumbura Mairie	2.52	[0.98 – 6.48]	1.77	[0.78 – 4.01]
Rumonge	2.16	[0.93 – 4.99]	1.38	[0.70 – 2.75]
Observations	5,388		5,388	

Notes:
¹ The p-value indicates statistical strength of association of the covariate.
 *p<0.05; **p<0.01; ***p<0.001.
 CI = confidence interval; ref = reference; RR = relative risk.

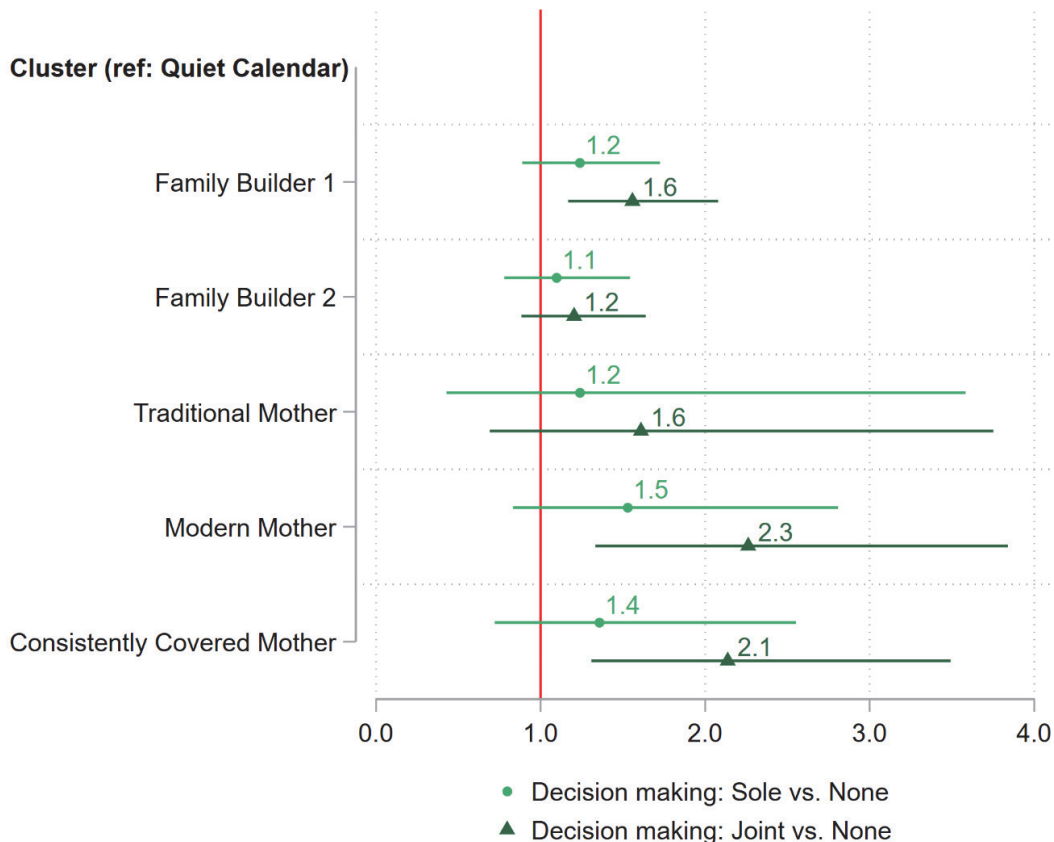
After accounting for IPV, marital control, fertility intentions, and other covariates that we would expect to impact contraceptive decision-making power, the results highlighted the importance of 5-year reproductive calendar histories to predict decision making in the majority of the clusters. The relative risk of making a joint decision with a partner or husband was 1.6 times higher for women in the Family Builder 1 cluster than for women in the Quiet Calendar cluster (RR: 1.56; p<0.001; 95% CI: 1.17–2.08). Following a similar trend, the relative risk of joint decision-making power was more than two times higher for women in the Modern Mother and Consistently Covered Mother clusters than for women in the Quiet Calendar cluster (RR: 2.3 and 2.1, respectively). There was no statistical evidence of a difference in terms of contraceptive decision making among women in the Family Builder 2 and Traditional Mother clusters when compared with women in the Quiet Calendar cluster. In terms of sole decision-making capacity, there was no statistical evidence of its association with any of the clusters.

Our multivariable multinomial regression model illustrated statistical evidence of associations of marital suspicion, current contraceptive method use, age, current employment, and region with contraceptive decision-making power. Women experiencing marital suspicion had a 26% reduced relative risk of jointly deciding whether or not to use contraception when compared with women who had not experienced marital suspicion (RR: 0.74; p = 0.04; 95% CI: 0.56–0.98). Women using traditional methods had a 67% reduced

relative risk of solely deciding whether or not to use contraception when compared with women who did not have any decision-making power to use or not use contraception (RR: 0.33; $p = 0.01$; 95% CI: 0.14–0.76). Current use of modern methods and current use of traditional methods, as reported at the time of the survey, both served as strong predictors of joint contraceptive decision making (RR: 2.90 and 2.66, respectively). In addition, women’s work status was important in predicting both sole and joint decision making. The relative risk of making a sole decision regarding contraception was nearly two times higher for women who were working than for women who were not working (RR: 1.98; $p < 0.001$; 95% CI: 1.37–2.85). A similar positive relationship was found between current employment status and joint decision making. Lastly, living in certain regions in Burundi appeared to predict either type of decision making (sole or joint); however, caution must be made when interpreting these relative risk and confidence interval results, as sample sizes for each category were small.

Figure 3 is a forest plot of women’s decision-making power to use or not use contraception in relation to the clusters, after accounting for other variables of interest. This figure illustrates the adjusted relative risks from the multinomial logistic regression analysis.

Figure 3 Forest plot of women’s decision-making power to use or not use contraception, after accounting for other variables of interest, Burundi DHS 2016-17



There was evidence that women in the Family Builder 1, Modern Mother, and Consistently Covered Mother clusters had a higher relative risk than women in the Quiet Calendar cluster of jointly deciding (with their

partners or husbands) whether to use contraception, after adjusting for other factors. Other clusters did not show statistical evidence of an association with any type of decision-making power. When examining whether women who decided to use contraception were different from those who decided not to use it, the sensitivity analysis conducted did not change the results. The clusters behaved similarly whether examining only the subgroup who decided to use or only the subgroup who decided not to use contraception. Therefore, we believe that the results were robust.

4 DISCUSSION

In a novel application of 5-year longitudinal reproductive calendar data from the Burundi DHS, sequence and cluster analyses had been used to identify six contraceptive clusters among women (MacQuarrie, Juan, Allen, Zweimueller, and Gemmill 2019). Our study was a first attempt to test and prove the robustness of these clusters to inform research, policy, and programs and to elucidate women’s current contraceptive decision-making power. Given deviations and variations from the original six clusters in our sample of women (appendix figure), we also examined the nuanced journeys of these women. We assessed whether factors such as marital control and IPV impact women’s current contraceptive decision-making abilities, and we included a variable on current method use to account for the lag in time between the 5-year calendar data histories (in the form of clusters) and current decision-making abilities (at the time of the survey).

Even after accounting for marital control and violence, fertility, family planning, and socioeconomic factors, we found that three of the six clusters—Family Builder 1, Modern Mother, and Consistently Covered Mother—showed strong statistical evidence of higher relative risk of jointly deciding whether or not to use contraception with their partners or husbands than for not deciding about contraception, when compared with women in the Quiet Calendar cluster. These clusters have a lasting relationship with women’s current decision-making power, even after controlling for many salient factors, conveying the importance of examining women’s reproductive journeys. The outcome variable in our study represents *current* contraceptive decision making at the time of the survey. While a woman’s decision-making power is likely fluid and intertwined with her reproductive and contraceptive experiences, information about her past decision-making process through the 5-year calendar, and how it may have influenced cluster membership, is unknown given the unavailability of data. Although cross-sectional data are more readily available, we propose that using calendar data to add depth of understanding to women’s experiences is a crucial—and underutilized—step in examining current contraceptive decision-making behaviors. This study contributes to the need to examine retrospective histories to understand reproductive empowerment. A recent study looking at economic and reproductive empowerment called for addressing this important gap in research (Gammage, Joshi, and Rodgers 2020).

Some of our key findings were expected. Women who belonged to the Modern Mother and Consistently Covered Mother clusters had a two times higher relative risk of jointly deciding whether or not to use contraception than women in the Quiet Calendar cluster. Both clusters were characterized by use of modern methods after a pregnancy event, with Modern Mothers characterized by their use of short-acting methods and Consistently Covered Mothers by their use of long-acting reversible contraceptives. This finding may reflect the accessibility of sexual and reproductive health services or women’s power to make decisions around the postpartum period.

Another finding from our study that is worth noting is that women experiencing marital suspicion had a 26% reduced relative risk of jointly deciding whether or not to use contraception when compared with women who had not experienced marital suspicion (RR: 0.74; $p = 0.04$; 95% CI: 0.56–0.98). This confirmed our hypothesis given that marital suspicion is defined as the partner or husband being jealous, accusing the respondent of being unfaithful, or insisting on knowing where the respondent is at all times. Previous research points to control of movement as a hindrance to gender-equitable relationships (Blum, Mmari, and Moreau 2017), and this may reduce a woman’s relative risk of making decisions about contraceptive use

and health care. Beyond the contraceptive clusters, our results offer important insights into the relationship between women's experiences with violence/controlling partnerships and their ability to make decisions.

What is perhaps less straightforward is the nature of who makes decisions and who is involved in the decision-making process. Decision-making power related to contraception varies according to context. Sole decision-making behavior is not associated with cluster membership; however, joint decision making is associated with cluster membership. A study in Malawi that examined couples' communication and decision-making dynamics also found that joint decisions were common among couples, although they may be much more nuanced than sole decisions. For example, one woman in the study cited that a joint decision was made about family planning but also stated that her husband made the final decision in terms of going to the clinic (Hartmann et al. 2012). Acknowledging that a joint decision was made does not provide a full picture of the nature of a woman's decision-making power. We do not know much beyond the woman's involvement in the decision, such as the process or relative influence of each party. Our findings complement other studies in the sub-Saharan context where other reproductive events, such as having a large family, may inform a woman's decision-making power within a household (Ngenzebuke, De Rock, and Verwimp 2018), or where having more children may increase a woman's status in the household and thus her decision-making power (Richards and Bass 2019).

Of the six clusters, three displayed statistical evidence of a relationship with joint contraceptive decision-making power, and this has potential programmatic-level implications. Previous studies have shown that men's involvement in their partner's reproductive behaviors and decisions is influential, so family planning programs have been encouraged to target and engage couples, therefore integrating men into discussions regarding reproductive health (Biddlecom and Fapohunda 1998; Hartmann et al. 2012). Couples counseling programs that address gender and social norms related to relationships should consider integrating healthy communications strategies; if there are norms around jealousy and knowing where a spouse is at all times, this may impact a woman's ability to make decisions to use or not use contraception. The relative risk of joint decision-making power is at least two times higher among women who use a short- or long-term modern method of contraception, which coincides with previous research that has found greater unmet need among women who do not know their husband's preferences (Nzokirishaka and Itua 2018). A woman's perceived ability to make choices about her own reproductive health hinges not only on notions of empowerment and agency, but also on incentives around fertility and other family planning factors.

Our study has limitations worth noting. The original study we built upon (MacQuarrie et al. 2019) excluded girls age 15-19 given previous research that little fertility or contraceptive use takes place in the years that would have been reflected in the reproductive calendars of these girls (MacQuarrie, Mallick, and Allen 2017). However, Burundi was one of the countries in the multi-country study that had evidence of fertility among very young adolescents (ages 10-14) (MacQuarrie, Mallick, and Allen 2017). The clusters examined in our study therefore left out an especially important demographic since young women in Burundi may be sexually active, starting families, or using contraception. The inclusion of these women might even have changed the clusters that were revealed through the sequence analysis, so further work should be done to understand how the calendar events of very young adolescents influence their ability to make decisions regarding contraception. In addition, this analysis included current method use as a covariate. Although the contraceptive clusters took into account a contraceptive method if the method was used three months before the survey, the clusters did not account for any events (including method use) within the three months immediately preceding the survey. We felt it was pertinent to include this covariate because the clusters

represent a multitude of unique experiences and because women may be using methods not typified by their clusters. This covariate has a strong relationship with decision-making power to use or not use contraception, so including it created a more thorough and robust analysis.

Finally, we believe that the names of the clusters may be rooted in bias, so clusters should be interpreted with care, taking into account the sequences of events that are represented. This study illustrates that the two clusters of Family Builders—Family Builder 1 and Family Builder 2—are different. Women who belong to the Family Builder 1 cluster are less likely to experience unmet need and more likely to have used family planning in their lifetime (MacQuarrie, Allen, and Gemmill 2020). Additionally, women in the Family Builder 1 cluster have greater contraceptive knowledge and intend to use family planning in the future, while the opposite is true for women who belong to the Family Builder 2 cluster (MacQuarrie, Juan, and Gemmill 2020). More research is needed to disentangle and distinguish these two types of women from one another to better understand their unique needs and behaviors. Nonetheless, using clusters based on a pattern of key events in a woman’s reproductive life gives greater insight into a woman’s journey and its effect on her current ability to make important decisions for her own health and well-being.

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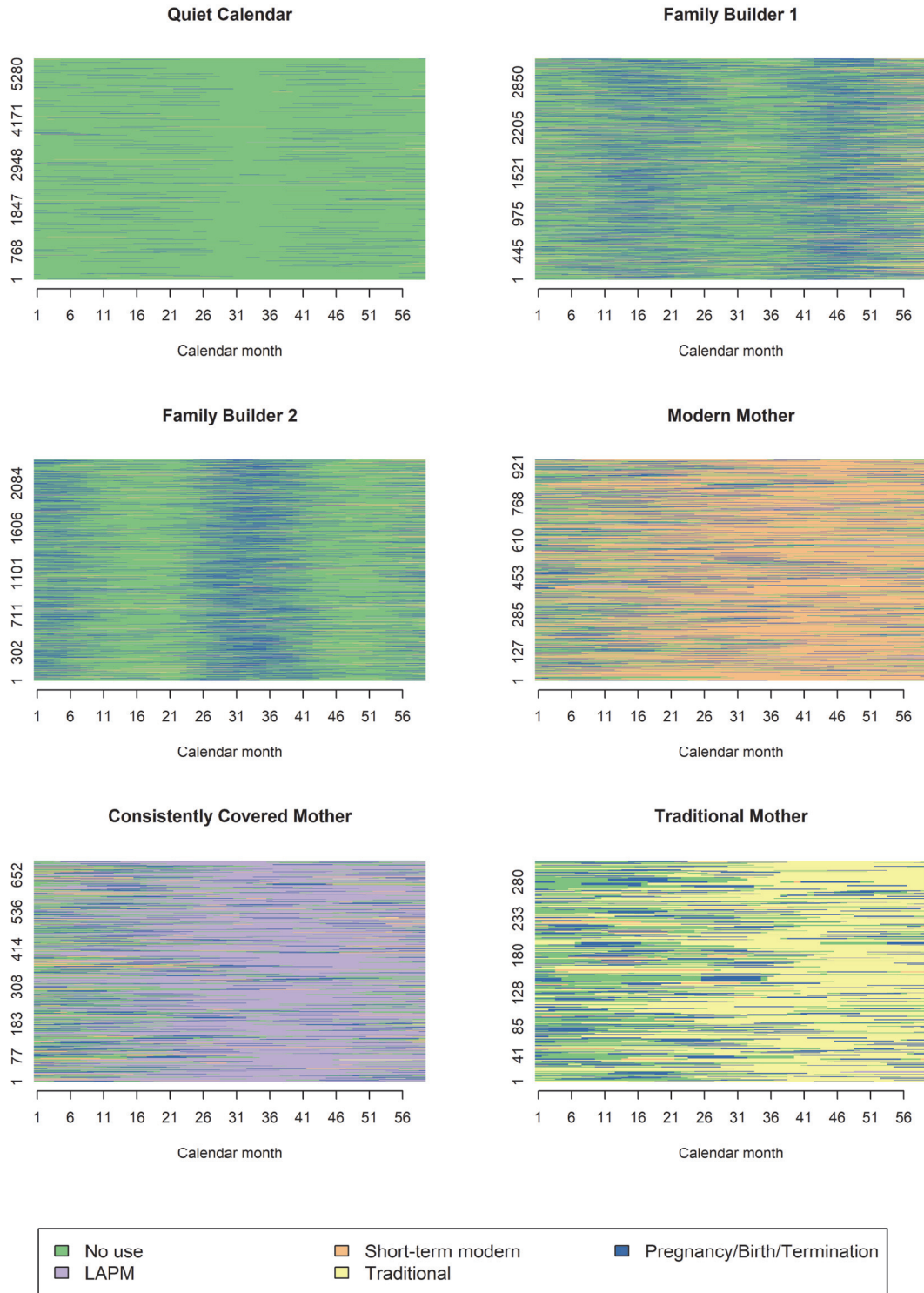
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APPENDIX

Appendix Figure Sequence index plot of each Burundi contraceptive cluster



Note: LAPM = long-acting or permanent method.