WOMEN'S CONTRACEPTIVE PROFILES THROUGHOUT THE LIFE COURSE IN BURUNDI AND NEPAL

DHS ANALYTICAL STUDIES 72
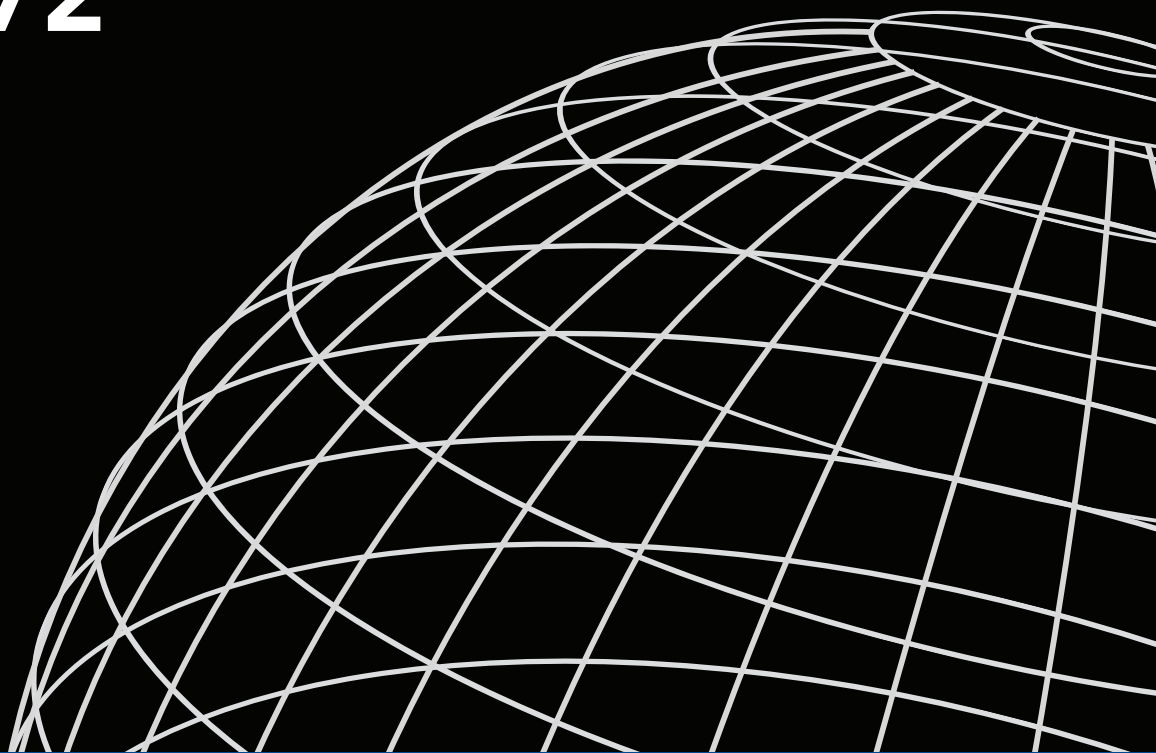
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Women's Contraceptive Profiles throughout the Life Course in Burundi and Nepal

Kerry L. D. MacQuarrie[1]
Christina Juan[2]
Courtney Allen[2]
Sally Zweimueller[2]
Alison Gemmill[3]

ICF
Rockville, Maryland, USA

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[1] The DHS Program, Avenir Health
[2] The DHS Program, ICF
[3] Johns Hopkins Bloomberg School of Public Health

Corresponding author: Kerry L. D. MacQuarrie, The DHS Program, 530 Gaither Road, Suite 500, Rockville, MD 20850, USA; phone: 301-572-0282; fax: 301-407-6501; email: Kerry.macquarrie@icf.com

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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 Analytical Studies 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 U.S. Agency for International Development.

It is hoped that the DHS Analytical Studies 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

This study uses sequence and cluster analysis to identify profiles that characterize women's dynamic contraceptive use and pregnancy experiences by using 5-year, retrospective, longitudinal data from the Demographic and Health Surveys (DHS) contraceptive calendars. We conduct this analysis in two countries with differing contexts: Burundi and Nepal. We also develop new data visualizations to display these dynamic contraceptive profiles and to demonstrate how they shift over the life course.

Despite the differing contexts, we find several commonalities in the contraceptive profiles. We identify six distinct profiles in each country. Quiet Calendar and Family Builder profiles, which involve little to no use of contraception, are present in both countries and have the same age distribution. There are a greater number of small differences in the profiles that involve contraceptive use. These profiles are the Modern Mother (short-term, modern method use), Consistently Covered and Consistently Covered Mother (long-acting and permanent method use), and Traditional Mother and Consistently Traditional (traditional method use). Sequences in these profiles commonly include pregnancies in Burundi, whereas in Nepal, the Consistently Covered, Consistently Modern, and Consistently Traditional profiles consist of women who use one type of contraception, without interruption or pregnancy, for the 5-year sequence. The Modern Mother profile presents in both countries, with minor variations in the timing of pregnancy and contraceptive adoption.

The largest difference between the Consistently Covered Mother and Consistently Covered profiles, which increases with age in Nepal but is concentrated in the middle reproductive ages in Burundi, is the age distribution of the other profiles of women using contraception in both countries. These differences may reflect differences in the fertility regimes and method mix of the two countries. The data visualizations of women's dynamic contraceptive profiles, their age pattern, and characteristics of their members over the life course provide a roadmap both for expanding the analysis to additional countries and conveying the results to program managers.

Key words: contraceptive use, contraceptive calendar, contraceptive profiles, sequence analysis, cluster analysis, Burundi, Nepal

ACRONYMS AND ABBREVIATIONS

ASWw   average silhouette width (weighted)

CPR   contraceptive prevalence rate

DHS   Demographic and Health Survey

EC   emergency contraception

FP   family planning
FPE   Family Planning Effort index

HC   Hubert's C
HG   Hubert's gamma

IUD   intrauterine device

LAM   lactational amenorrhea method
LAPM   long-acting and permanent methods
LARC   long-acting, reversible contraception

mCPR   modern method contraceptive prevalence rate
MII   method information index

NHFS   Nepal Health Facility Survey
NHSP   Nepal Health Sector Program
NIDI   Netherlands Interdisciplinary Demographic Institute

PACE   Policy, Advocacy, and Communication Enhanced for Population and Reproductive
              Health Project
PAM   partitioning around medoids
PBC   point biserial correlation
PHE   population, health, and environment

R^2 pseudo R^2
R^2sq   pseudo R^2 squared

SDM   standard days method
SHA   System of Health Accounts
STS   state-transition-state

TFR   total fertility rate

UNFPA   United Nations Population Fund
USAID   United States Agency for International Development

1　BACKGROUND

1.1　Introduction

Reproductive health and family planning service providers serve women of all ages, from a wide range of circumstances and with a variety of health needs. Understanding clients' needs is key to serving them well. It is important to understand the diversity of needs that a client presents over the course of her reproductive lifetime, from menarche in her teens through menopause later in adulthood. Often, research inadequately captures the nuances of a woman's reproductive health and family planning journey across her life course.

Much of the data that we use to capture women's family planning journeys over their lifetimes comes from cross-sectional data, such as service statistics captured in the Health Management Information System and surveys of households and facilities. These data are critical to understanding present circumstances. Some essential indicators in this field, such as unmet need for family planning, are decidedly cross-sectional in nature, and provide a picture of latent demand for contraception and the extent to which that demand is met or not by the existing services at a given moment in time (Casterline and Sinding 2000).

These data and indicators are useful, but contrast with what we know about the dynamic nature of women's contraceptive experiences and needs as the circumstances of their lives change over the broad contours of the life course. Clearly, the circumstances and contraceptive behavior are very different for an unmarried, sexually active adolescent, when compared to a married woman in the midst of her active reproductive years who may be concerned about infertility, wants to ensure a healthy pregnancy or to space her childbearing, and is different still for an older married woman who wants to prevent any additional pregnancies. Beyond broad changes in life course, changes also occur over short spans of time. To wit, there is a robust literature on changing fertility preferences among individual women (Bernardi, Mynarska, and Rossier 2015; Roy et al. 2003; Rucinski et al. 2018; Speizer and Lance 2015; Trinitapoli and Yeatman 2018). Women who may experience unmet need today may not next month, while women who do not use contraception this month may adopt a method in the near future, just as women who are using contraception today may discontinue contraception in several months (Casterline, El-Zanaty, and El-Zeini 2003; Furnas 2016; Jain 1999; Jain et al. 2014).

Cross-sectional data cannot convey such near-term changes. Researchers using cross-sectional data gain purchase on the dynamic nature of women's contraceptive lives across the broader life course by disaggregating the data by age or other life course factors (e.g., parity or marital status). This involves comparing women at different points of the life course at the same period in time, rather than following individual women over time. Longitudinal examination of women's contraceptive experiences is rare, although exceptions include studies in a variety of settings that indicate women move in and out of states of contraceptive use, even over periods of time as short as 1-2 years (Bawah 2002; Casterline, El-Zanaty, and El-Zeini 2003; Dasgupta, Zaba, and Crampin 2015; Furnas 2016; Roy et al. 2003; Rucinski et al. 2018; Speizer and Lance 2015; Speizer et al. 2013). The reliance on readily available cross-sectional data and the relative paucity of longitudinal data leads us to view women's contraceptive lives as more static than we know them to be.

The Demographic and Health Surveys (DHS) follow the same cross-sectional mold as many other data sources. DHS surveys are nationally representative cross-sectional surveys of women of reproductive age that are repeated approximately at 5-year intervals. These surveys do not follow the same women over time or adopt a panel design. However, they have embedded in them an option for longitudinal analysis: the contraceptive calendar. The calendar is a retrospective longitudinal tool to analyze changes in contraceptive behavior and pregnancy experience among individual women over a period of 5 to 7 years before the interview. This component of the survey is a rich, largely untapped source of data, which can be used to analyze recent periods in women's reproductive lives.

One application of longitudinal data in DHS calendars is the analysis of contraceptive discontinuation rates (Ali, Cleland, and Shah 2012; Castle and Askew 2015; Jain et al. 2013). Indeed, a primary motivation behind developing the calendar as a data collection tool was the ability to analyze such contraceptive dynamics as method switching, discontinuation, and failure rates. New efforts have emerged to visualize some of these contraceptive dynamics by using DHS calendar data. These include a Duke University initiative to depict movement between contraceptive methods at two points in time (Finnegan 2019), and an online tool that displays discontinuation rates, which will be launched by the Population Reference Bureau before the end of 2019 (https://www.prb.org/program/pace-moving-family-planning-and-reproductive-health-forward/). Both tools allow the user to interact with the data. In general, however, calendar data have not been used to describe other aspects of women's reproductive life experience, and analysis of contraceptive dynamics is typically devoid of a life course perspective.

Using cross-sectional data, several researchers have tried to make cross-sectional data more useful to reproductive health programmers by applying market segmentation methods. These methods use data on current family planning status, socioeconomic characteristics, and, especially, attitudes to group women into different homogenous profiles (market segments) that characterize their needs and inclination to use a particular service. Some of this work reiterates the importance of life stage to understanding women's contraceptive needs. In one study of contraceptive nonusers in the Philippines, the authors contrast "Young Intenders" from older, "Ready to Limit" women (Wang et al. 2009). A study in Niger found differences in age and marital status between groups of women who "trust family planning and the health system" and who "accept limiting" (Dalglish et al. 2018). However, these studies generally focus on attitudes and do not analyze women's behaviors.

One study moved beyond cross-sectional data to the analysis of longitudinal data. Using Markov chain model-based clustering of 1996 Brazil DHS calendar data, the researchers identified common subgroups based on contraceptive behavior in calendars and found seven population subgroups with differential contraceptive use and dynamics (Dias 2013). However, this study did not examine life course factors, and in fact eliminated consideration of life course changes by restricting the analysis to women age 20-34. With the exception of this study, the longitudinal data available in DHS contraceptive calendars are not used to characterize profiles of women based on their contraceptive behavior over time, which is a missed opportunity.

1.2   Study Aims and Hypotheses

This study aims to identify patterns in women's contraceptive and pregnancy experience, not using typical cross-sectional measures but, instead, the more dynamic experiences captured in retrospective, longitudinal

data. To do this, we put to new use DHS contraceptive calendar data in two countries with differing contexts: Burundi and Nepal. Specifically, we apply sequence and cluster analysis of longitudinal data to identify discrete profiles that characterize women's contraceptive and pregnancy behaviors over the previous 5 years. This is believed to be the first such application of these methods to nationally representative longitudinal contraceptive data.

We also seek to develop new ways to visualize women's profiles and their dynamic contraceptive experiences, to describe how these profiles manifest over the life course, and to display salient characteristics of women in these profiles at each age. We intend for these visualizations to convey the data in a nuanced, dynamic, and user-friendly way for program implementers, policymakers, and researchers, and to increase understanding of women's contraceptive journeys in a comprehensive but simple way.

2   METHODS

2.1   Country Selection

This study analyzes calendar data from two recent surveys: the 2016-17 Burundi DHS and the 2016 Nepal DHS. We selected these two country surveys for two reasons. First, Burundi and Nepal are located in separate geographic regions and reveal very different contexts for contraceptive behavior, fertility, marriage, and family formation, as described in the next chapter. Second, previous studies on reporting of contraceptive use, pregnancy outcomes, and age and date reporting in reproductive calendars suggest that surveys in these countries are above-average in data quality (Bradley, Winfrey, and Croft 2015; MacQuarrie et al. 2018; Pullum and Staveteig 2017). Details of the two surveys and their descriptive results can be found in their final reports (Ministère à la Présidence chargé de la Bonne Gouvernance et du Plan - MPBGP et al. 2017; Ministry of Health - MOH/Nepal, New ERA/Nepal, and ICF 2017). The DHS Program may extend the analytical approach used in this study to additional DHS surveys with contraceptive calendars in the future.

2.2   Data

2.2.1   Contraceptive calendar

Extensive details of the contraceptive calendar, sometimes known as the reproductive calendar, and how to use its data for analysis are provided elsewhere[1] (Bradley, Winfrey, and Croft 2015; Croft, Bradley, and Allen 2018). Briefly, The DHS Program has used the contraceptive calendar to collect data since 1990. The calendar records a retrospective history of more than 5 years in monthly episodes of events in a woman's reproductive life. Data are recorded in two columns for all months of the calendar. In the first column, each month has a recorded event, also known as a state: *use of a contraceptive method, non-use, birth, pregnancy, or termination* (which encompasses any non-live birth outcome: miscarriage, abortion, or stillbirth). These are referred to as monthly codes. In any month when a contraceptive method was reported, the method is specified from a list of 18 standard methods[2] (Figure 1), and in some cases, country-specific methods. It is notable that during data collection, missing data for any month in the first column is not allowed. Only one code can be entered for each month. If a woman used more than one method in a given month, the more effective method is recorded (Hatcher et al. 2011). A second column records the reason for discontinuation for any month when a contraceptive method had been used but was discontinued. This study makes use of the data collected only in the first column.

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[1] See also tutorial videos describing the calendar: *DHS Contraceptive Calendar Tutorial Part 1: Completing the Contraceptive Calendar* (https://youtu.be/_7V6S5ljnZc) and *DHS Contraceptive Calendar Tutorial Part 2: Data Structure of the Contraceptive Calendar* (https://youtu.be/T2pS8IM0jyU).

[2] These codes are for the following 18 methods: periodic abstinence/rhythm, withdrawal, standard days method (SDM), other traditional methods, abstinence, pill, injectables, diaphragm, male condom, lactational amenorrhea method (LAM), female condom, foam and jelly, emergency contraception, other modern method, intrauterine device (IUD), female sterilization, male sterilization, and implants.

Figure 1   Example of the contraceptive calendar in the DHS questionnaire

INSTRUCTIONS:
    ONLY ONE CODE SHOULD APPEAR IN ANY BOX.
    COLUMN 1 REQUIRES A CODE IN EVERY MONTH.

CODES FOR EACH COLUMN:

COLUMN 1: <u>BIRTHS, PREGNANCIES, CONTRACEPTIVE USE</u> (2)
  B BIRTHS
  P PREGNANCIES
  A ABORTION
  C MISCARRIAGE
  S STILLBIRTH

  0 NO METHOD
  1 FEMALE STERILIZATION
  2 MALE STERILIZATION
  3 IUD
  4 INJECTABLES
  5 IMPLANTS
  6 PILL
  7 CONDOM
  9 EMERGENCY CONTRACEPTION
  J STANDARD DAYS METHOD
  K LACTATIONAL AMENORRHEA METHOD
  L RHYTHM METHOD

  M WITHDRAWAL
  X OTHER MODERN METHOD
  Y OTHER TRADITIONAL METHOD

COLUMN 2: <u>DISCONTINUATION OF CONTRACEPTIVE USE</u>

  0 INFREQUENT SEX/HUSBAND AWAY
  1 BECAME PREGNANT WHILE USING
  2 WANTED TO BECOME PREGNANT
  3 HUSBAND/PARTNER DISAPPROVED
  4 WANTED MORE EFFECTIVE METHOD
  5 SIDE EFFECTS/HEALTH CONCERNS
  6 LACK OF ACCESS/TOO FAR
  7 COSTS TOO MUCH
  8 INCONVENIENT TO USE
  F UP TO GOD/FATALISTIC
  A DIFFICULT TO GET PREGNANT/MENOPAUSAL
  D MARITAL DISSOLUTION/SEPARATION
  X OTHER
        _____
        (SPECIFY)
  Z DON'T KNOW

During data collection, the length of the calendar in each survey varies, depending on the date of interview, because each calendar includes the months in the year of the interview through the month of interview plus 5 calendar years—also collected as months—before the year of interview. As a result, the calendar will include over 60 months of data. Also, the length of the calendar for individual women in the same survey also varies because the calendar includes the month of the interview and fieldwork typically spans several months.

In the standard recode data files released by The DHS Program (https://www.dhsprogram.com/Data/), the monthly codes of the first column of the calendar in the questionnaire are converted into a single string variable of 72 positions (characters) long, named vcal_1. Each character of this string variable is a monthly code that represents one of the states: non-use, specific method used, or a pregnancy, birth, or termination. Essentially, the column in the questionnaire has been transformed into a variable that resembles a horizontal string of characters in the data file, as depicted in Figure 2. Although the string is in reverse chronological order in the data file, it is shown here as chronological from left to right. The last character of the string is shaded to highlight the month of interview.

Figure 2   **Example schematic of codes in the DHS calendar string variable (vcal_1) in standard recode files**

Years of data	
	2013	2014	2015	2016	2017	2018		
vcal_1	00000000PPT003333330000000011111111000000000088888PPPPPPPPB0001111111
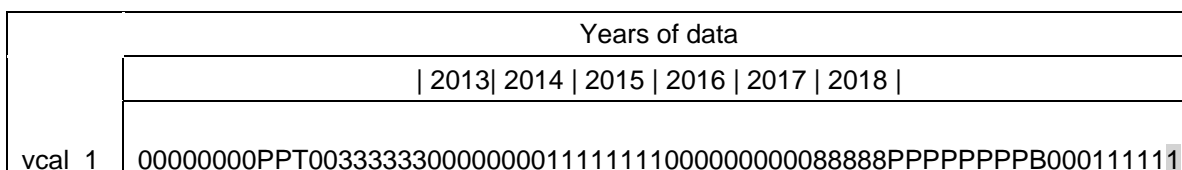
In this study, we use the publicly available recode data file for individual women (denoted as an IR file) for Burundi and Nepal. We make several modifications to the calendar data to prepare it for sequence and cluster analysis. First, we place three restrictions on the data, namely restrictions on the period of observation, the number of states, and the age of the sample.

2.2.2   Data management

Restriction on the period of observation

The first restriction is to limit the observation period of the calendar. We do not analyze each month for which data were collected in women's calendars. First, we omit the most recent 3 months. We omit the month of interview because it is an incomplete month and some events, which may yet occur (e.g., contraceptive use or a pregnancy) before the month is complete, will not be reported. We omit the next most recent 2 months because some women who are pregnant at the time of the interview may not yet recognize that they are pregnant. This exclusion is common in analysis of contraceptive discontinuation rates and pregnancy rates because this underreporting of current pregnancy would bias failure and pregnancy rates. Similarly, and of relevance to this study, underreporting of current pregnancy would represent misclassification of the states experienced close to the time of the interview.

We also omit months at the beginning of the calendar so that the observation period for each woman is the same. Specifically, we observe 59 months of data for each woman so that month 1 is the earliest point in the woman's calendar (approximately 5 years before the interview) and month 59 is the most recent month

(3 months before the interview). This restriction provides a 59-month calendar sequence of states for each woman.

Restriction on states

The second restriction condenses the 22 or more states (18 contraceptive methods plus non-use, birth, pregnancy, or termination) in the calendar into five possible states:

1. No use of contraception

2. Use of a short-term, modern method of contraception

3. Use of a long-acting or permanent method (LAPM) of contraception

4. Use of a traditional method of contraception

5. Pregnancy, birth, or termination.

Short-term, modern methods include pill, injectables, male or female condom, lactational amenorrhea method (LAM), emergency contraception (EC), and, in Burundi only, standard days method (SDM).[3] Traditional methods include periodic abstinence/rhythm, withdrawal, other traditional or folkloric methods, and, in Nepal only, SDM. LAPM methods include two long-acting, reversible (LARC) methods—IUDs and implants—plus two permanent methods—female and male sterilization.

Age restriction

The third restriction we make is an age restriction. DHS surveys typically interview women of reproductive age (age 15-49) at the time of the interview. Because the calendar is a retrospective tool, we have information about women at the start of their calendar sequence when they are 5 years and 3 months younger compared to the time of the interview. This is shown in the Lexis diagram in Figure 3. Previous research with DHS calendars indicates that young adolescents are neither sexually active nor biologically fecund (MacQuarrie, Mallick, and Allen 2017; Pullum, Croft, and MacQuarrie 2018). As a result, most states of interest to this analysis—contraceptive use and pregnancies—would be absent from calendars for women age 10-14. Therefore, we exclude women who are younger than age 15 at the start of their calendar sequence.

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[3] The DHS Program considers the standard days method to be a modern method in those countries that have an active program to explain and promote the method, and a traditional method in countries that lack such a program.

Figure 3 **Lexis diagram of ages observed during the calendar sequence and age of the sample at time of survey**
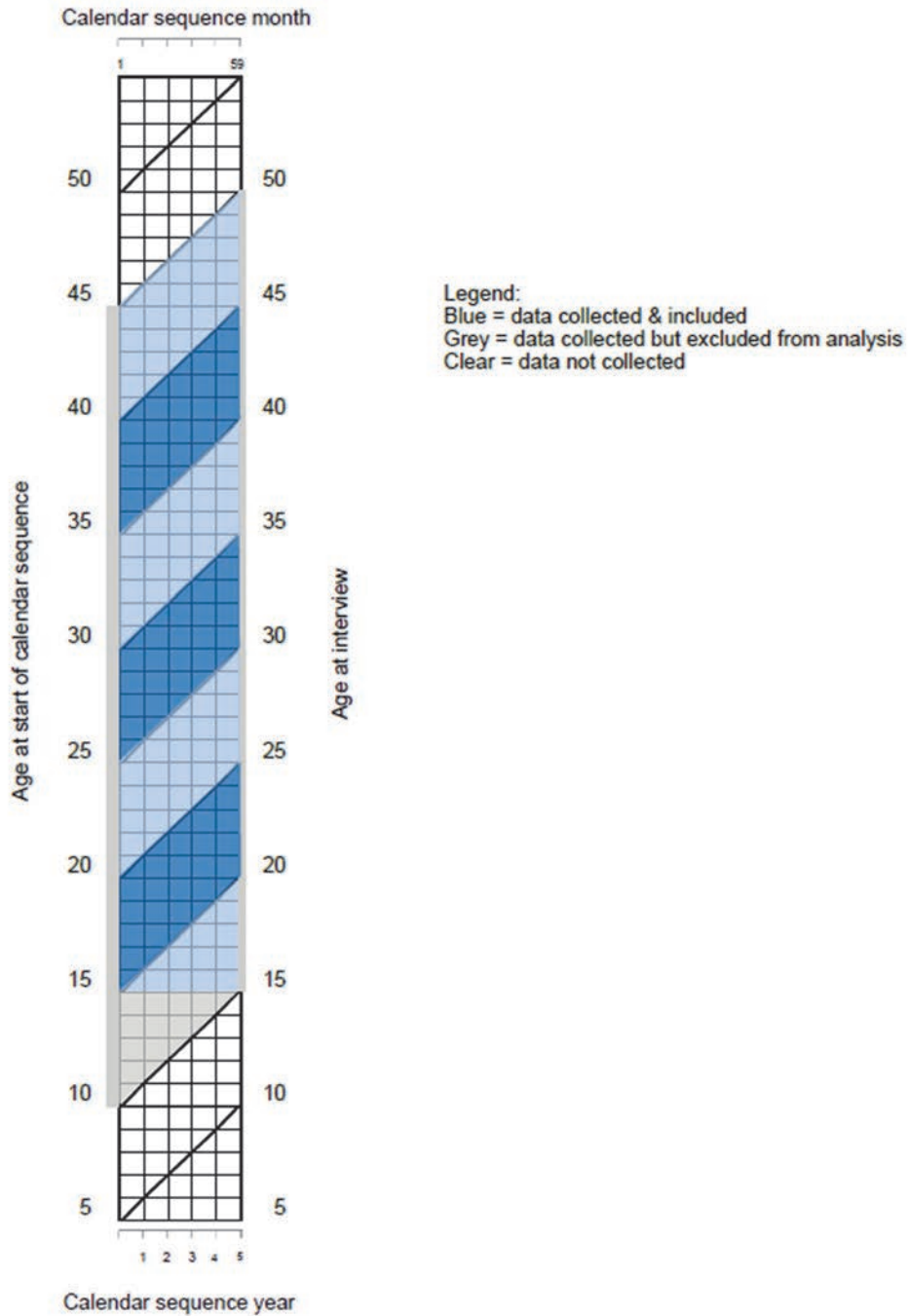
The Lexis diagram also shows less data at the older end of the age spectrum. Blue shades indicate cohorts of women for whom calendar data are collected and used in the analysis. Grey shading indicates data are collected but excluded from our analysis, while empty cells indicate that data are not collected and therefore not available for analysis.

Because DHS surveys do not interview women age 50 and older, we do not have calendar data for women who are age 49 at the start of their calendar sequence, 5 years earlier than the interview, as shown by the empty parallelogram at the top of Figure 3. The oldest women in our sample are age 40-44 at the start of their calendar sequence. In addition, there is attrition at each year of age within this age group, with fewer cases who are age 44 at the start of the calendar than cases who are age 40 or younger, as indicated by the 45° line transecting the age 45-49 quadrant in Figure 3.

Dataset format

In addition to these three data restrictions—period of observation, states, and age—we modify the format of the dataset. We transform the calendar string variable in the standard recode IR file into a state-transition-state (STS) format. This process of formatting the dataset for analysis entails separating the single string variable into 59 separate, numerical (categorical) variables, with one variable per month capturing the state that corresponds to that month. Month 1 refers to the start of the calendar sequence, and month 59 refers to the month closest to the time of interview.

2.3   Analytical Strategy

We conducted sequence and cluster analysis based on the states found within each woman's calendar sequence. As mentioned above, states are the events that women experience during their family planning journey (shown in the first panel of Figure 4). A state can be defined, for example, as when a woman does not use any form of contraceptive method in a given month. Another example of a state would be use of contraception. A sequence is a set of states that women experience, and that reveals the order, timing, length, and transitions between states. In this case, observed transitions may include switching from one contraceptive method to another, or discontinuing a method, among others. See Figure 4 for the steps in our analytical strategy.

Figure 4   Steps in the data preparation and analytical strategy
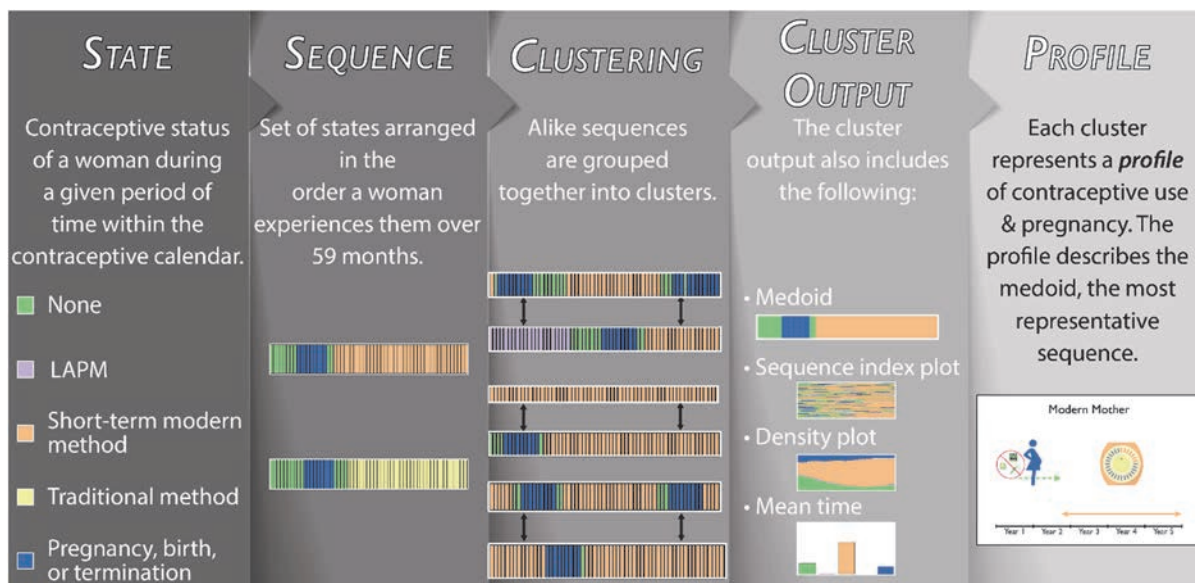
We take the data with the five states defined earlier and shown in the first panel of Figure 4—no use, use of short-term modern methods, traditional method use, LAPM/permanent method use, and pregnancies and

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their outcomes—and examine how these states are arranged in women's calendar sequences (second panel of Figure 4). We then use sequence analysis and clustering techniques to group similar sequences together. Each cluster represents a profile of women's contraceptive behavior. We describe the characteristics of each profile and how frequently they occur over the life course.

As described earlier, women's calendar sequences begin 5 years and 3 months before the interview and end 3 months before the interview. We conduct our analysis on women whose calendar sequences begin at age 15 or older. This means that we exclude 4,085 sequences from the Burundi and 2,699 sequences from the Nepal analytical samples contributed by women who were age 15-19 at the time of the interview because their sequences were experienced from age 9 to age 14. Because of the young age structure of the populations in each country, this is a sizable proportion of the full samples: 24% and 21%, respectively. Our analytic sample, using women's sequences as the unit of analysis, comprises 13,293 weighted cases in Burundi and 10,187 weighted cases in Nepal.

2.3.1   Sequence analysis

Sequence analysis is a scientific approach that aims to understand process, content, and events rather than units, attributes, and cause (Abbott 1995). According to Abbott, the term "sequence" refers to an ordered list of elements for analysis. Sequence analysis is a descriptive tool used to provide an overall picture in order to identify typical and atypical patterns in histories (Helske et al. 2014). Sequence analysis provides the ability to understand patterns in a collection of sequences, and the ability to detect how one prior event sequence affects the immediate future. For example, we may want to predict childlessness given a prior sequence of fertility expectations (Gemmill 2019).

Data management and descriptive analyses are conducted in Stata SE 15. We take the resulting dataset of women's calendar sequences in each study country and conduct sequence analysis in R using the TraMineR and WeightedCluster packages (Gabadinho, Ritschard, Mueller, et al. 2011; Gabadinho, Ritschard, Studer, et al. 2011; Studer 2013). All analyses are weighted with sample weights available in standard DHS data recode files to account for sampling probability and nonresponse. Each woman's calendar sequence is exactly 59 positions (months) long, with no data missing in any position of the sequence.

To conduct sequence analysis, we first construct a dissimilarity matrix that quantifies the distance—or dissimilarity—between each pair of sequences (sets of states) in the dataset. We use Optimal Matching to calculate distances, rather than generalized or Dynamic Hamming distance-matching procedure. Optimal Matching allows for insertions and deletions, as well as substitutions, in computing distances, while Hamming allows only for substitutions (Gabadinho, Ritschard, Mueller, et al. 2011; Gabadinho, Ritschard, Studer, et al. 2011). An Optimal Matching approach therefore better accounts for the sporadic timing of pregnancies in the sequences by potentially aligning these events over time.

The distances between pairs of sequences in the dissimilarity matrix are based on the pairwise costs—the cumulative set of operations (substitutions, insertions, and deletions) of the states that would be required to make one sequence exactly the same as the other sequence in the pair. We use a constant cost matrix to measure pairwise distances between sequences that assumes uniform costs for all substitutions, insertions, or deletions. Alternatives were a data-derived, transition rate-based cost matrix or a matrix with a priori defined costs derived from theory. Testing showed that quality metrics and results were not sensitive to whether a constant-cost or a transition-rate-cost matrix was applied.

2.3.2 Cluster analysis

Finally, we conduct cluster analysis on the dissimilarity matrix to group together women whose calendar sequences exhibit similar patterns of contraceptive use and pregnancy experience (third panel of Figure 4). We test two clustering procedures: a Ward hierarchical clustering algorithm and a k-medoid (partitioning around medoids, or PAM) clustering algorithm. The hierarchical clustering procedure is based on an agglomerative process in which sequences are grouped with the next closest sequence to form a group, and the two closest groups are combined, repeatedly, until all form a single group; the succession (or agglomeration) schedule can be depicted as a hierarchical dendrogram to facilitate partitioning of clusters (Studer 2013). The k-medoid clustering procedure identifies a set number of medoids (the representative sequences) that have the smallest sum of distances from all other sequences, and partitions all sequences into clusters around these medoids (Studer 2013).

We assess a series of quality metrics, such as those used in similar research (Gemmill 2019; Studer 2013), and are guided by evidence of local peaks (high scores on the quality metrics at a given number of clusters) or local troughs[4] to determine a preferred and instructive number of clusters. Specifically, we applied the following quality metrics: average silhouette width (weighted) (ASWw), Hubert's C (HC), Hubert's gamma (HG), point biserial correlation (PBC), pseudo R^2 (R^2), and the pseudo R^2-squared (R^2sq). In the case of the HC, a local trough (low score on the metric) indicates higher quality. The metrics also test the sensitivity and fit of various clustering parameters.

We chose the k-medoid with constant costs clustering procedure based on these metrics. The k-medoid clustering algorithm consistently outperformed the Ward hierarchical algorithm by all metrics in both countries, regardless of which costing basis was used. A comparison of constant costs versus transition rate-based cost matrix performed nearly identically on the quality metrics in both countries. However, the local peaks and troughs were more distinctive with the constant cost-based cost matrix, which made the preferred number of clusters easier to discern. We further conducted cross-classification analysis, which confirmed low sensitivity to the choice of cost matrix. In both countries, the medoids were identical and the vast majority of sequences (all but 309 in Burundi and 606 in Nepal) were assigned to the same cluster, regardless of the cost matrix used.[5]

2.3.3 Moving from clusters to contraceptive profiles

In Burundi and Nepal, we identified six clusters as the preferred solution. These clusters form our longitudinal profile of contraceptive use and pregnancy experience, and are described in the subsequent chapters of this report. The cluster analysis produces several outputs that we use to characterize the contraceptive use and pregnancy experience of women in each profile (fourth panel of Figure 4). We examine the medoid sequence of each cluster. This is the central and most representative sequence in each cluster and is the single sequence that best represents all sequences in the cluster. We also present the sequence index plot for each cluster. This plot depicts all sequences in a single cluster, and indicates the

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[4] For the Hubert's C metric only, the number of clusters is guided by local troughs because a lower score indicates higher quality on this metric.

[5] The largest difference in Burundi was that 279 sequences assigned to the cluster we named Family Builder I were allocated to the cluster named Family Builder II when a transition-based cost matrix was used, and, in Nepal, 485 sequences from the Family Builder profile were allocated to the Quiet Calendar cluster when using a transition-based cost matrix.

range or diversity of women's contraceptive and pregnancy experience in the same cluster. In addition, we present a plot of the mean time women in each cluster spend in each of the five states. Density plots for each cluster also depict the proportion of time spent in each of the five states in more detailed form by presenting each moment (month) across women's calendar sequences.

These visualizations—medoid, sequence index, mean time, and density plots—describe the common attributes of women's contraceptive and pregnancy experience over the course of 5 years in each of the six profiles. These profiles are summarized in a fifth visualization, which presents the medoid sequence in an iconographic representation (fifth panel of Figure 4).

In Burundi and Nepal, we then examine the distribution of the six profiles across each age group to develop a sense of the life course experience of women in these profiles. We further look beyond the attributes of women's sequences to examine other current characteristics of women in each profile. We present the levels of unmet need for family planning and method mix among contraceptive users. Other characteristics of women that we examine include women's education and wealth status, number of children born, and fertility preferences, among others. Within each profile, we present a sampling of these characteristics at each age, highlighting indicators that are relevant at that point of the life course. We present these as static infographics, as an example of their potential to be developed as an interactive, online dashboard in which users could select programmatically relevant factors by which to examine profiles across the life course.

2.4   Limitations

This study has several limitations. First, we do not use every state that was present in the original dataset. There are too many original states (up to 18 contraceptive methods plus non-use, pregnancy, birth, or termination) to easily interpret the results, and using them all would have increased computational complexity. To ease interpretation and estimate parsimonious results, we grouped the original states into five condensed states using an a priori classification scheme. We grouped pregnancies and their outcomes together and combined types of contraceptive methods together, i.e., LAPM methods, short-term modern methods, and traditional methods.

Grouping states in this manner has two implications. One is that it implies that transitions within one category are less meaningful than transitions between categories. For example, it implies that transitioning from pill use to injectables is less meaningful than from pill use to inserting an IUD, discontinuing altogether, or becoming pregnant. While this a priori classification has a conceptual basis and is a common categorization of contraceptive methods, we did not test this empirically. A second implication of reducing the number of states is that we reduce the total number of transitions we are able to observe in any sequence. This makes it appear as if women's 5-year contraceptive histories are more stable and less dynamic than they may actually be.

A second limitation of the study is that we do not observe women's retrospective calendar sequences for women of all ages. We do not have data for women at age 45-49 (or older) at the start of their calendar sequence available to us because DHS surveys do not sample women age 50 or older. We exclude women in the youngest age group, who are under age 15 at the start of their sequences. This exclusion represents a substantial loss of data, given the youthful skew in the age structure of the population in our two study countries. This loss is offset by the fact that calendar sequences for young women are nearly all empty of activity, containing a single state of no use for their entire 59-month duration.

A third limitation is the duration of time for which we observe women. Our ability to examine women's contraceptive and pregnancy experiences retrospectively over 5 years is an improvement over analysis of current timepoint measures only, which provides more nuance about women's dynamic experiences. Nonetheless, because this is a retrospective design rather than a long-running, prospective or panel design, we do not follow the same women throughout all stages of their reproductive life course. To better understand how women move from one profile to another and which personal characteristics or life course factors influence their profiles throughout the life course, we adopt the same analytical strategy used in most cross-sectional analyses. We compare women of different age groups at the same time.

In addition, our analysis of calendar sequences is subject to the reliability of DHS calendar data. It is possible that there exists some underreporting of contraceptive use in general, or of certain methods specifically, and of pregnancies, particularly those that do not end in a live birth, or that their timing could be misreported. Further, such misreporting may not be consistent throughout the duration of the calendar. Analyses of the quality and consistency of calendar data in terms of contraceptive use, terminations, and perinatal mortality indicate that reporting of these events is higher in the more recent periods of the calendar compared to the start of the calendar period, and that this increase in reporting cannot be explained by trends in these events (Bradley, Winfrey, and Croft 2015; MacQuarrie et al. 2018).

A fifth limitation is that although we focus on clusters (profiles) as our main outcome, the individual sequences that comprise the cluster are themselves heterogeneous to some extent. Moreover, the summary profiles, while representative, obfuscate less-common transitions or experiences in women's calendar sequences. That is to say, not everyone who belongs to a profile is going to have the same experience as the medoid—the representative sequence for the profile. We think that the calendar sequences of these women will share the same features of the medoid as a function of the data-driven approach that we use. However, some women may have more overlap with the representative sequence than others. For example, some women in a profile characterized by no use of contraception and no pregnancies may have used a contraceptive method at some point in her sequence. It is a byproduct of an analytical method designed to seek out commonalities to highlight majority experiences and downplay minority experiences.

Finally, this study is limited in its geographic coverage and generalizability. We analyze data for only two countries, neither of which can represent the entire geographic region in which they are located. Sub-Saharan Africa and South Asia are too diverse to be described by a single country, and we do not analyze any countries from other global regions. We are unable to conclude if the patterns we observe in these two countries represent common experiences likely to be found elsewhere, or if they are idiosyncratic patterns particular to these specific settings. It is our hope that this analysis can be extended to other countries with a DHS contraceptive calendar in the future in order to better assess generalized patterns.

3   BURUNDI

3.1   Setting

Burundi has the 8th highest total fertility rate (TFR) among the 86 countries for which DHS has data (ICF 2015). At 5.5 children per woman in 2016-17, the TFR has fallen only modestly from 6.9 in 1987 (Ministère à la Présidence chargé de la Bonne Gouvernance et du Plan - MPBGP et al. 2017).

Burundi is also one of 69 FP2020 priority countries, and one that has made commitments toward FP2020's ambitious goal of 120 million additional users of modern contraception by 2020 (Brown et al. 2014). The latest round of the Family Planning Effort (FPE) index in 2014 found that Burundi earned high scores in its policy component, driven in part by its importation policies, program leadership, and freedom from restrictions on contraceptive advertising (Track20 2015). In 2018, the government of Burundi established a National Office of the Population to promote coordination among sectors to further its pursuit of an integrated population, health, and environment (PHE) approach to family planning (Scoggins et al. 2018).

Burundi also focuses on the delivery of community-based health care, and scaling up performance-based financing at the community level. Burundi demonstrated the largest improvement in the services component of the FPE (from 33% in 2009 to 54% in 2014), with top scores in training, logistics, supervision, and staff performance (Track20 2015). These improvements helped to propel a 16-point increase in the overall FPE score over this time, which is now the third highest FPE score of the 16 countries assessed in the Francophone/Lusophone Sub-Saharan Africa region (Kuang and Brodsky 2016). Nonetheless, assessment of family planning programs indicates that domestic funding of the family planning budget is in need of continued improvement (Track20 2015). Domestic government expenditures on family planning were estimated to be $976,000 in 2013 (WHO/SHA (System of Health Accounts), as reported in Scoggins et al. 2018).

Paralleling the slow decline in TFR, demand for family planning has grown modestly from 54% to 58% since the previous DHS in 2010, as has the contraceptive prevalence rate (CPR) (Ministère à la Présidence chargé de la Bonne Gouvernance et du Plan - MPBGP et al. 2017). The method mix is dominated by injectables, which constitute 49% of all contraceptive use, and implants (26%), followed by condoms and pills, which account for less than 10% of all contraceptive use (Avenir Health 2018a). Analysis of the likely maximum modern contraceptive prevalence rate (mCPR), given the ideal number of children in Burundi, has led Avenir Health to conclude, "there was a large potential use gap, meaning there was room for additional growth in mCPR without changes in demand" (Avenir Health nd; Track20 2018a). Opportunities for growth in mCPR may also exist among postpartum women in particular.

3.2   Sample Description

We exclude 4,085 cases (23.7%) whose calendar sequences begin before age 15 from the analytic sample, which leaves 13,293 weighted cases. The remaining analytic sample continues to be relatively young, with nearly half of women beginning their sequences at age 15-19 or 20-24. Only 9% were age 40-44 when their sequences began. The characteristics of the sample are described in Table 1. Details of the sample disaggregated by age group can be found in Appendix Table A1.

Table 1   Burundi sample description: Percent distribution and means of sociodemographic characteristics of respondents (n=13,293)

	%	N
Age at start of calendar		
15-19	24.2	3,219
20-24	22.6	3,006
25-29	18.3	2,431
30-34	14.6	1,941
35-39	11.5	1,533
40-44	8.8	1,165
Type of place of residence		
Urban	12.5	1,666
Rural	87.5	11,627
Highest education level		
No education	44.8	5,955
Primary	36.8	4,896
Secondary+	18.4	2,441
Household wealth quintile		
Poorest	20.3	2,696
Poorer	20.2	2,688
Middle	20.1	2,671
Richer	18.9	2,513
Richest	20.5	2,725
Ever had sex		
No	12.5	1,656
Yes	87.5	11,637
Mean age at 1st sex (among those who have ever had sex)		
Mean	19.2	11,637
Marital status		
Never in union	17.3	2,293
Currently in union/living with a man	71.6	9,512
Formerly in union/living with a man	11.2	1,487
Husband/partner's residential status		
Living with her	87.8	8,351
Staying elsewhere	12.2	1,162
Marital duration		
Never married	17.3	2,293
0-4	13.1	1,740
5-9	19.6	2,609
10-14	16.8	2,232
15-19	14.2	1,892
20-24	10.9	1,444
25-29	6.5	858
30+	1.7	224

Continued…

Table 1—*Continued*

	%	N
Children ever born		
0	16.7	2,214
1	11.4	1,509
2	13.4	1,779
3	13.3	1,772
4	11.2	1,484
5	10.4	1,386
6+	23.7	3,150
Fertility desires		
Wants within 2 years	11.5	1,530
Wants after 2+ years	31.0	4,115
Wants, unsure timing	13.0	1,733
Wants no more/sterilized/infecund	44.5	5,915
Ideal number of children		
0	1.5	195
1	1.0	138
2	7.3	971
3	33.6	4,471
4-5	44.0	5,847
6+	10.5	1,394
Non-numeric response	2.1	276
Type of contraception currently used		
Not using	77.7	10,333
LARC/permanent method	7.4	989
Short-term modern method	10.3	1,373
Traditional method	4.5	598
Unmet need among currently married women		
No need	41.2	3,922
Unmet need	30.1	2,862
Met need	28.7	2,728

The sample is predominantly rural (88%) and has low educational attainment, with 45% of women having no education and 37% having primary education only. The women in the sample are evenly distributed across wealth categories, with slightly fewer women in the "richer" wealth quintile.

Nearly 88% have ever had sex, with a mean age of sexual debut among those having had sex of 19.2 years; 72% are currently married and another 11% are separated, divorced, or widowed. Approximately 17% have never married. Two in ten women have been married between 5-9 years, the modal response. Few women have been married longer than 24 years. A majority (88%) of currently married women are living with their husbands, while 12% of women's husbands are not co-resident at the time of the interview.
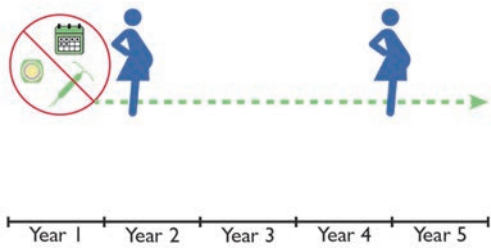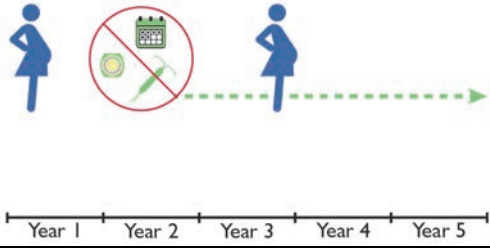
Nearly a quarter of women have six or more children, while 17% have no children at the time of the interview. Nearly half (45%) of the women report that they do not want any more children, while 31% want another child after 2 or more years. The ideal number of children is four to five for 44% of women and three children for another 37% of women. More than three-quarters of all women are using no method of contraception at the time of the interview, while 10% are using a short-term, modern method. Four in ten

currently married women presently have no need for family planning, while approximately three in ten have an unmet need and another three in ten have met their need for family planning through contraceptive use.

3.3   Contraceptive Profiles in Burundi

We conduct sequence and cluster analysis on a weighted sample of 13,293 women's sequences in Burundi. These women display 6,256 distinct sequences. From our cluster analysis,[6] we identify six separate profiles of contraceptive use and pregnancy experience. These profiles are described in Table 2.

Table 2   **Legend of contraceptive profiles identified in Burundi**

Burundi Contraceptive Profiles	
Profile Visualization	**Description**
Quiet Calendar 	Women who do not experience pregnancy or use any methods.
Family Builder I 	Women who do not use any method and experience two pregnancies, beginning at Year 2 and the end of Year 4.
Family Builder II 	Women who do not use any method and experience two pregnancies, beginning in Year 1 and at the end of Year 3.

Continued…

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[6] We conduct cluster analysis using a k-medoid (PAM) clustering algorithm with Optimal Matching of distances between sequences and a constant cost matrix.

Table 2—*Continued*

Burundi Contraceptive Profiles	
Profile	**Description**
Modern Mother 	Women who adopt a short-term modern method toward the end of Year 2 after a period of non-use and one pregnancy.
Consistently Covered Mother 	Women who adopt LARC or permanent methods after a period of non-use and one pregnancy.
Traditional Mother 	Women who adopt traditional methods at the end of year 2 after non-use and one pregnancy.

Legend for Contraceptive Profiles in Burundi

None.

Traditional methods include rhythm, withdrawal, or other.

Short-term modern methods include the pill, injectables, male condom, female condom, lactational amenorrhea method, emergency contraception, and standard days method.

LARC or permanent methods include the implant, IUD, female sterilization, and male sterilization.

Pregnancy, birth, or termination.

◄───► Consistent use

·····► Periodic use

Figure 5 shows the medoid—or most representative sequence—for each of these six profiles and their percent distribution. The most commonly occurring profile is one we term the Quiet Calendar. This profile describes the experience of 42% of women and is characterized by mostly no use of any contraception over the 59 months of their calendar sequences. One quarter of women fall into the Family Builder I profile, characterized by no use of contraception interspersed with pregnancies approaching the midpoint and late part of the calendar sequence. Another 18% of women are in the Family Builder II profile, which is similar to the Family Builder I. Women in the Family Builder II profile also do not use contraception and experience pregnancy, although they differ in terms of the timing of their pregnancies relative to the start of their calendar sequences. The medoid sequence indicates pregnancy occurring at the start and just after the midpoint of the 59-month calendar sequence.

Figure 5 **Representative sequence (medoid) and proportions of each contraceptive profile**
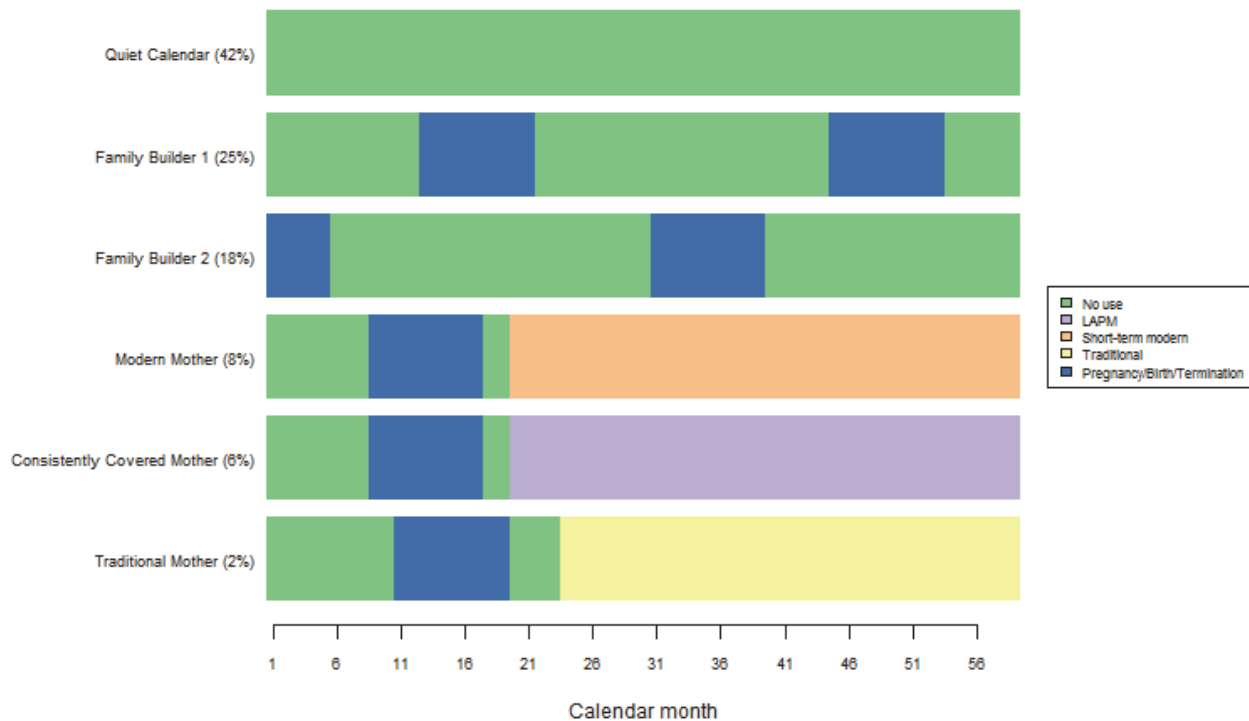
The remaining 16% of women belong to one of the remaining three profiles including contraceptive use. About 8% of women are in the Modern Mother profile. The sequence representing this profile indicates mostly use of short-term, modern methods of contraception, following a period of no use and pregnancy earlier in the sequence. The sequence representing the fifth profile, termed the Consistently Covered Mother, and consists of 6% of Burundi women. This profile indicates use of LAPM contraception for the majority of the calendar sequence, also following a period of non-use and pregnancy. The last profile, Traditional Mother, accounts for just 2% of women and consists primarily of use of traditional contraceptive methods. Like contraceptive users in the Modern Mother and Consistently Covered Mother profiles, this use of traditional methods also follows non-use and pregnancy. In no profile involving contraceptive use does the representative sequence begin with contraceptive use. Instead, contraception is adopted after about 18 months (3-9 months postpartum).

3.3.1   Profile 1: Quiet Calendar

Figure 6 shows the sequence index plot for the Quiet Calendar profile; that is, it displays the combined individual sequences for all 5,521 women in this profile. As such, it shows the variation of women's contraceptive use and pregnancy experiences in this profile. It indicates that most women do not use any contraception of any kind, denoted in green. There are very occasional episodes, which are usually short, of short-term, modern (orange), traditional (yellow), or LAPM (purple) use. Women in this profile also largely avoid pregnancy over their 59-month calendar sequences. Although this is the general pattern, a few women do experience a pregnancy (blue).

Figure 6   Full sequence index plot, Profile 1: Quiet Calendar
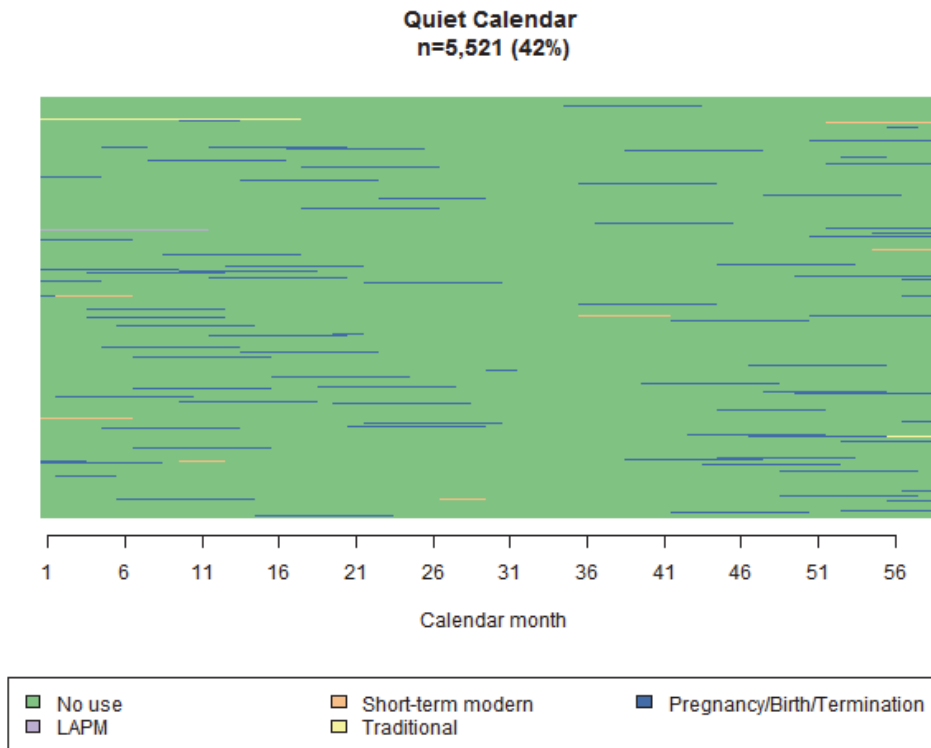
Figure 7, which indicates the mean time spent in each state for women in this profile, reinforces this finding. Of the 59 months, women in this profile spend an average of 56 months in the non-user state. On average, women in the Quiet Calendar profile spend only 2.5 months in a state of pregnancy and less than 1 month using short-term, modern methods, LAPMs, or traditional methods. This indicates the few women who experience these events.

Figure 7   Mean time spent in each state, Profile 1: Quiet Calendar
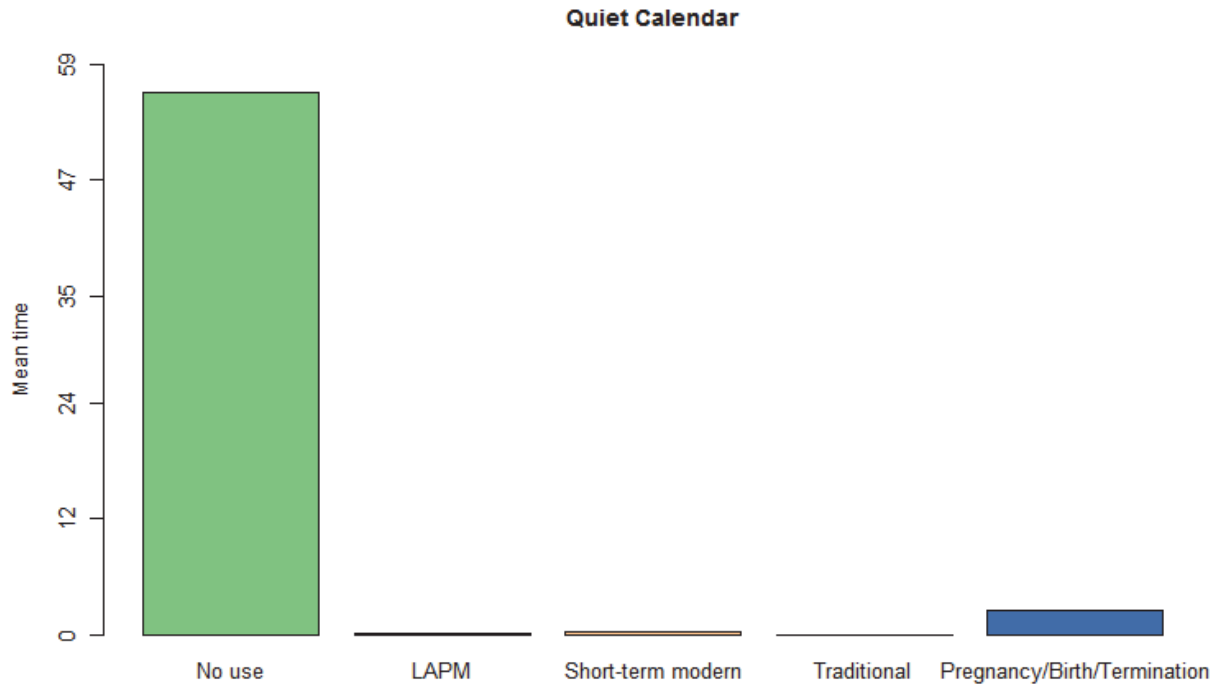
A density plot, which indicates in aggregate the proportion of time spent in the five states at each month of women's sequences for this profile, can be found in Appendix Figure A1.

3.3.2 Profile 2: Family Builder I

The sequence index plot for the Family Builder I profile, found in Figure 8, shows more diversity of women's experience. Sequences in this cluster are characterized by stretches of no contraceptive use, similar to those in the Quiet Calendar profile. However, many women also experience one or more pregnancies during their 59-month calendar sequence.

Figure 8   Full sequence index plot, Profile 2: Family Builder I

Family Builder 1
n=3,308 (25%)

Calendar month

Legend:
- No use
- LAPM
- Short-term modern
- Traditional
- Pregnancy/Birth/Termination
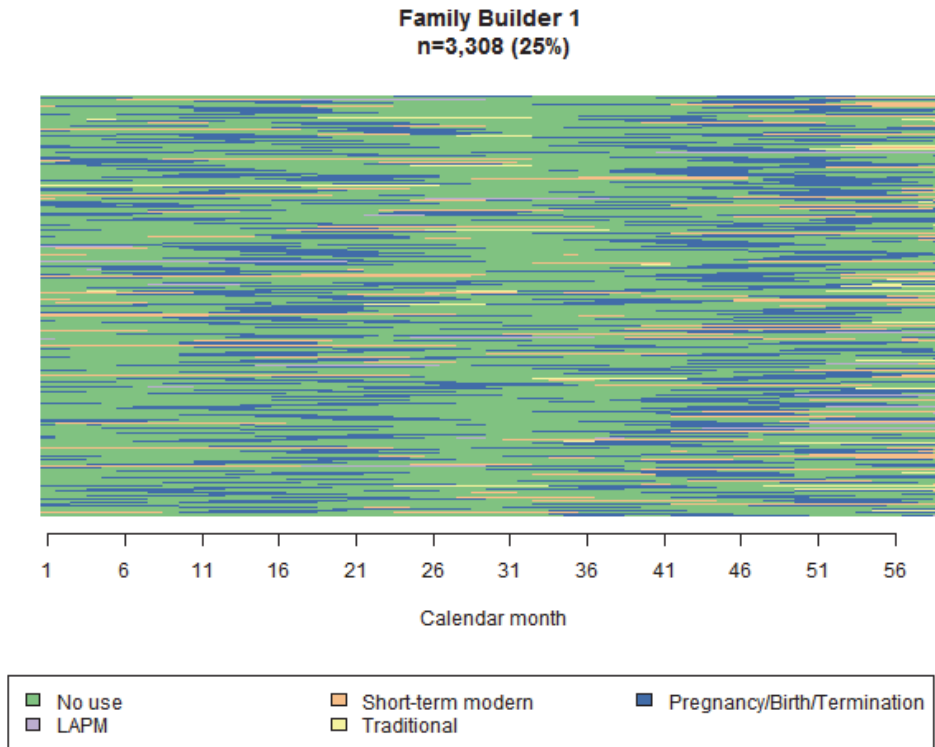
Indeed, Figure 9 indicates that women in this profile spend an average of 37 months not using contraception, and nearly 16.5 months in a state of pregnancy. The sequence index plot also indicates that use of any type of contraception is not characteristic of women's sequences in this profile. However, contraceptive use is more common than for women in the Quiet Calendar. Figure 9 shows that women in Family Builder I spend an average of nearly 4 months using short-term, modern methods and almost 1.5 months using LAPMs. Less than 1 month, on average, is spent using traditional methods in the sequences within this profile. The density plot for this profile can be found in Appendix Figure A1.

Figure 9   Mean time spent in each state, Profile 2: Family Builder I

Family Builder 1

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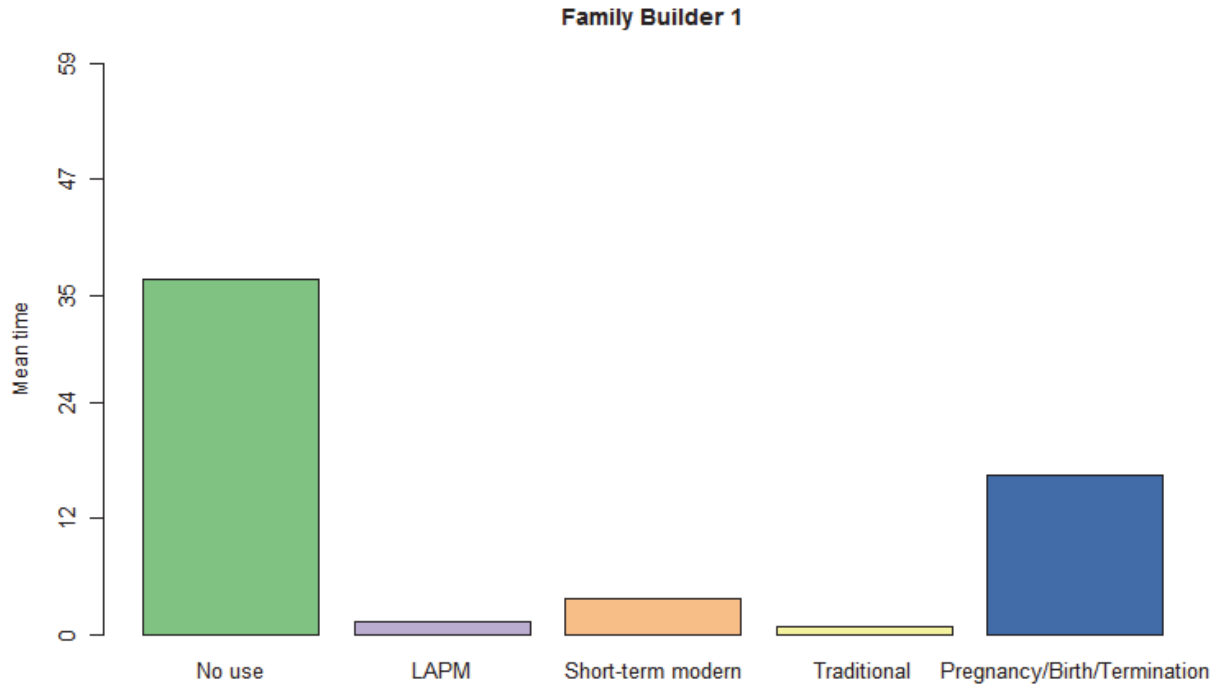
3.3.3 Profile 3: Family Builder II

Women's sequences in the Family Builder II profile are presented in Figure 10. This sequence index plot shows that most of the 2,400 women use no contraception whatsoever and experience two pregnancies that approximate the timing of those in the medoid, or representative sequence, which is near the start and just after the midpoint of the 59-month calendar sequence. Some women in this profile experience one pregnancy. A few women experience episodes of contraceptive use, but this is uncommon in this profile.

Figure 10   Full sequence index plot, Profile 3: Family Builder II
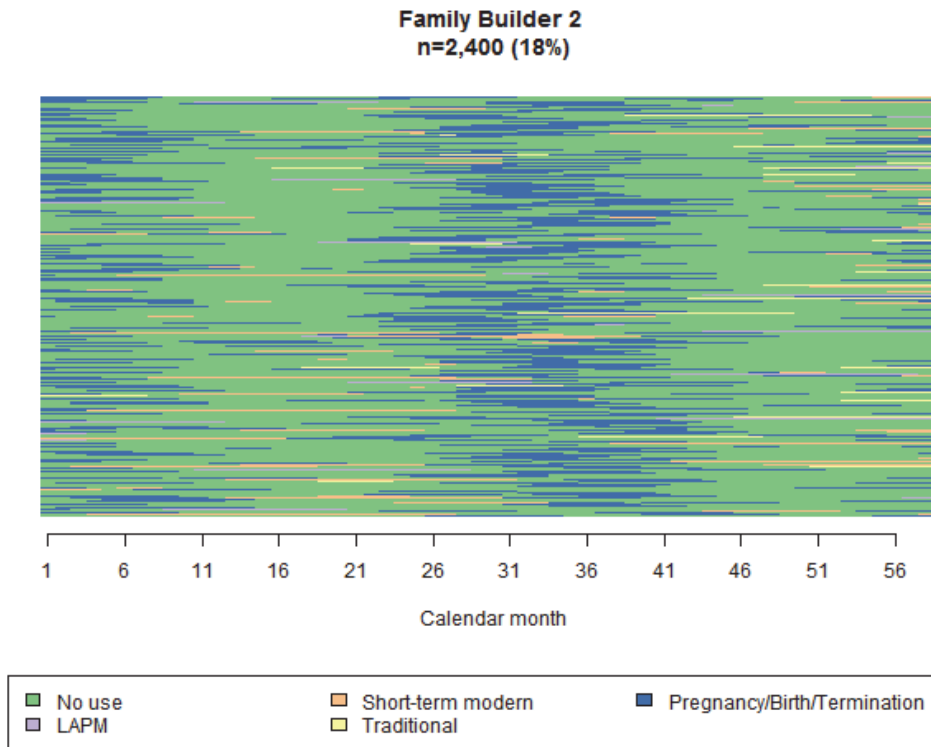
As shown in Figure 11, the proportion of time women spend not using any contraception and in a state of pregnancy on average is similar to that of women in the Family Builder I profile: 42 months and nearly 14 months, respectively. Women in Family Builder II spend an average of 2 months using short-term, modern methods of contraception and just under 1 month using LAPMs or permanent methods, while traditional method use makes up less than half of 1 month in women's sequences. The aggregate time spent in each state at each month of the 59-month calendar sequence can be found in the density plot for this profile in Appendix Figure A1.

Figure 11   Mean time spent in each state, Profile 3: Family Builder II

Family Builder 2
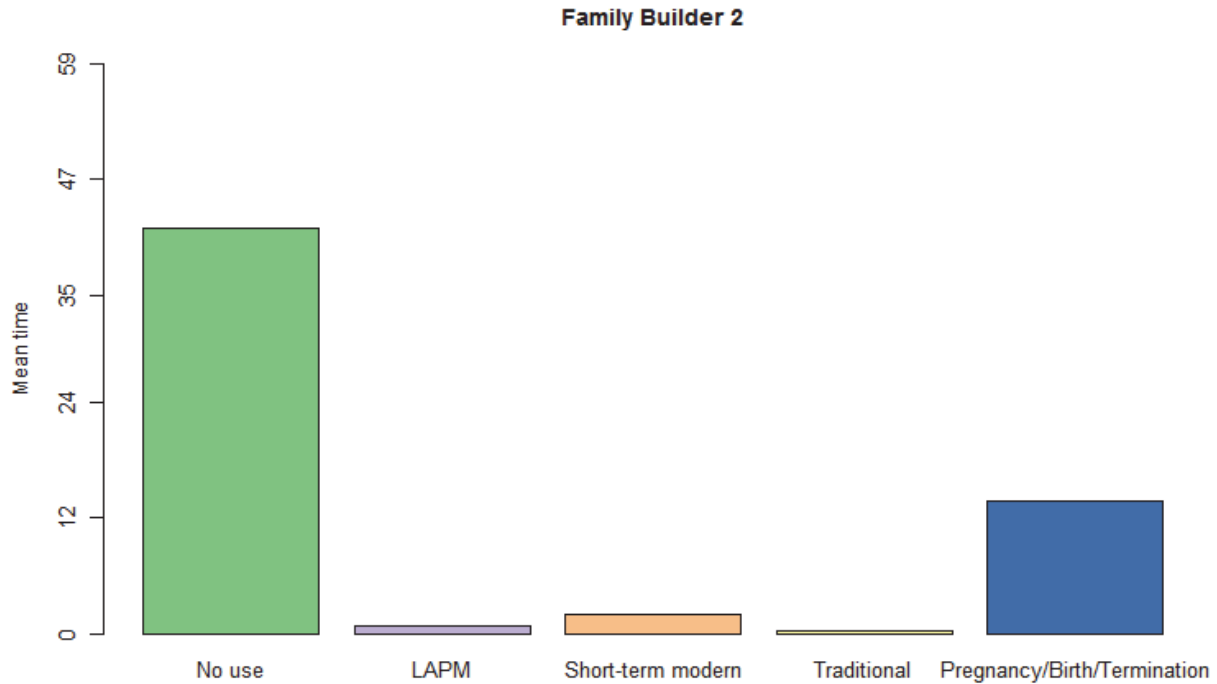
3.3.4 Profile 4: Modern Mother

The sequence index plot for the 1,007 women in the Modern Mother profile is shown in Figure 12. Greater use of short-term, modern methods of contraception is found in this profile than in any other. A total of 36 months, on average, is spent using these methods (see Figure 13). Use of short-term, modern methods does not exceed 4 months in any other profile.

Figure 12   Full sequence index plot, Profile 4: Modern Mother

**Modern Mother
n=1,007 (8%)**

Calendar month

- No use
- LAPM
- Short-term modern
- Traditional
- Pregnancy/Birth/Termination
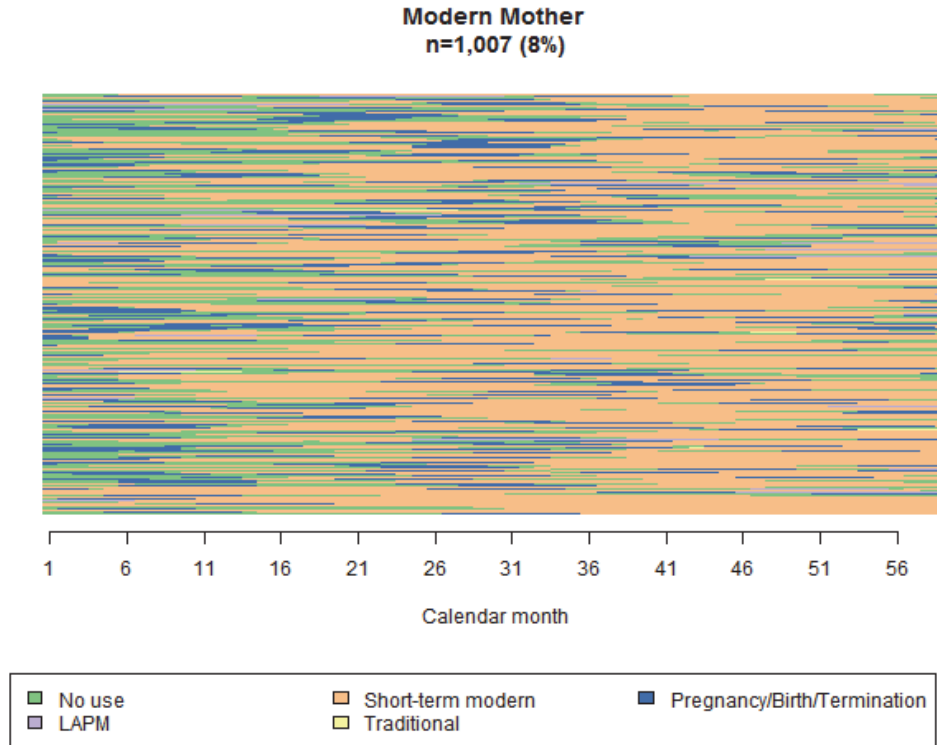
However, similar to the medoid for this profile (see Figure 12 above), the index plot reveals that short-term, modern method use is seldom the only state women in this profile experience over the course of the 59 months of their sequences. Most women also experience episodes of no use or pregnancy. Figure 13 shows that women spend on average 12.5 months and 9 months in these two states, respectively. There is more use of short-term, modern methods and fewer episodes of non-use and pregnancy in the later portions of the sequences. Use of traditional methods and LAPMs/permanent methods is negligible. Women use LAPMs for about 1 month and traditional methods for less than half of a month, on average. As with other profiles, the density plot is found in Appendix Figure A1.

Figure 13   Mean time spent in each state, Profile 4: Modern Mother
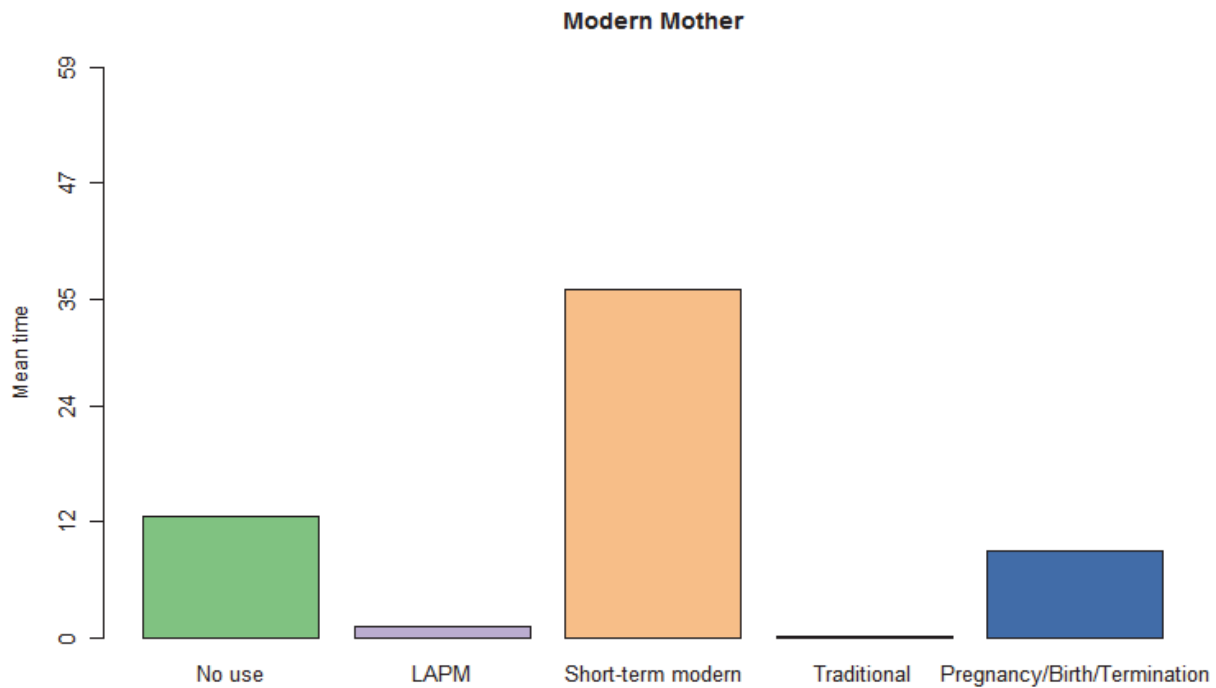
3.3.5   Profile 5: Consistently Covered Mother

The sequence index plot for the Consistently Covered Mother profile in Figure 14 shows LAPM use in each of the 750 sequences in this profile. Typically, women experience just one episode of LARC or permanent method use. The medoid sequence for this profile (Figure 5, earlier) portrays a sequence in which the woman adopted LAPM after an episode of not using contraception and/or a pregnancy. Inspection of the full sequence index plot in Figure 14 indicates that a typical pattern for women's sequences in this profile is no use of contraception, followed by a pregnancy, followed by LAPM use. In contrast, beginning a calendar sequence as a LAPM user is rare.

Figure 14 also shows a few women discontinue LAPM during their calendar sequence. Some of those who discontinue LAPMs subsequently experience a pregnancy, either immediately after discontinuation (contraceptive failure) or after a period of not using contraception.

Figure 14   Full sequence index plot, Profile 5: Consistently Covered Mother
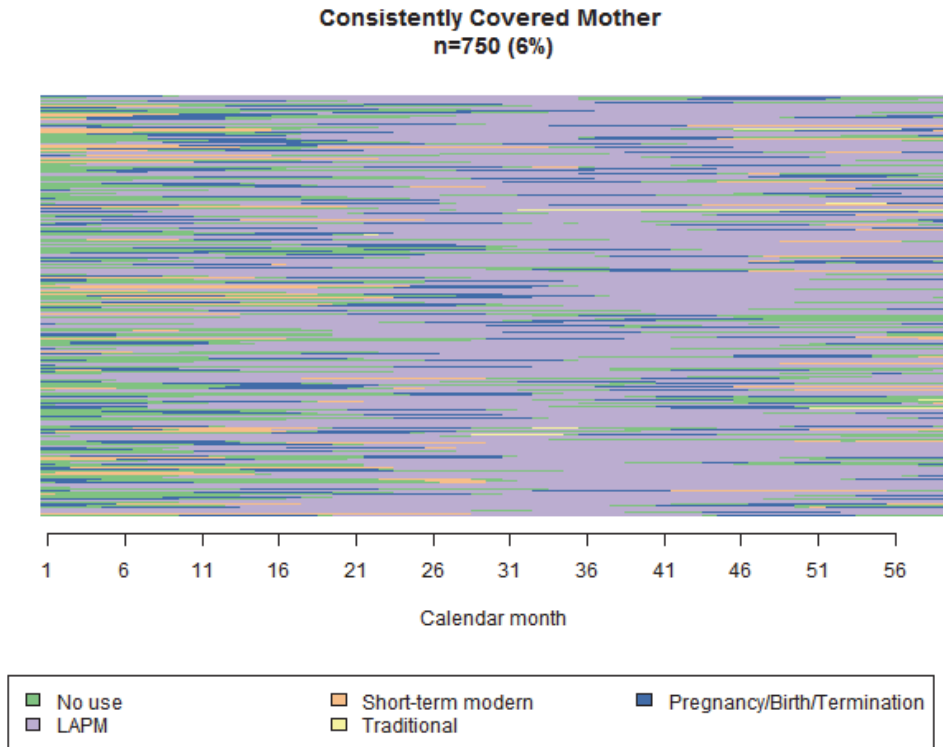
In this profile, LAPM use is concentrated in the middle and later half of the sequences. Overall, women spend an average of 38 months using LAPM, as shown in Figure 15. Women spend an average of about 11 months not using any contraceptive and 7 months in pregnancy, which is slightly less time than users of short-term, modern method users in the Modern Mother profile spend in these states. Short-term, modern method use makes up an average of nearly 3 months, while traditional method use is negligible. Details of the density plots are in Appendix Figure A1.

Figure 15   Mean time spent in each state, Profile 5: Consistently Covered Mother

Consistently Covered Mother
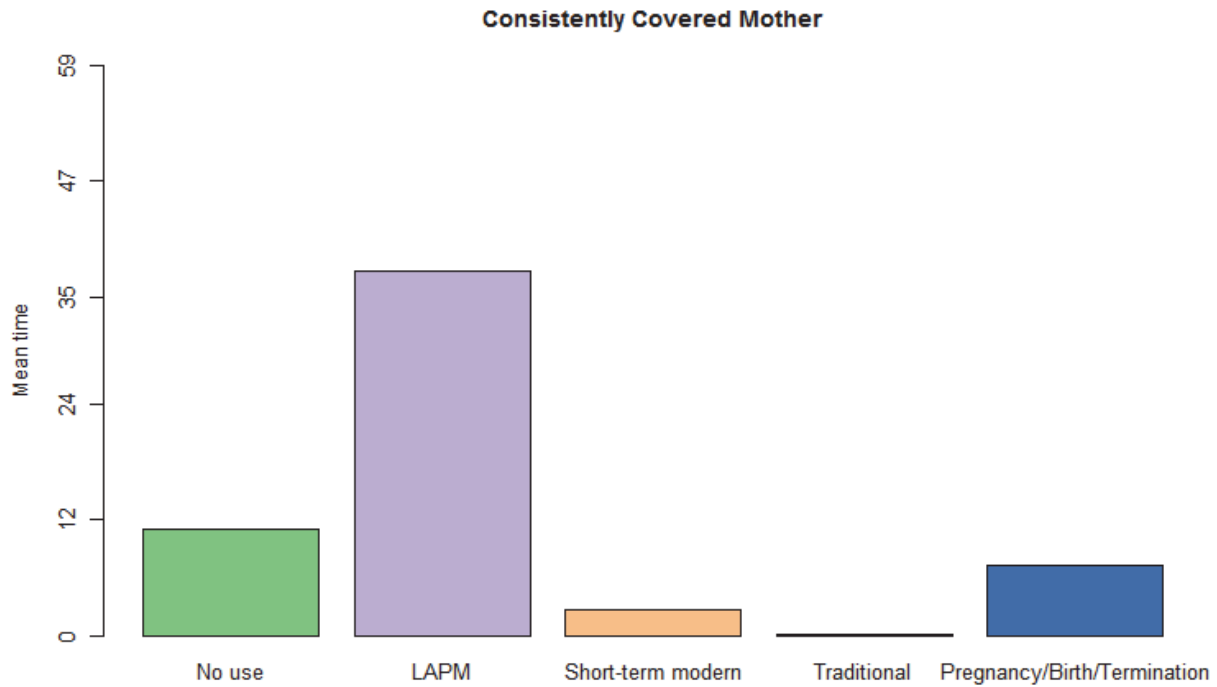
3.3.6 Profile 6: Traditional Mother

Comprising just 2% of the sample, the Traditional Mother profile is the only profile with substantial use of traditional methods. The sequence index plot in Figure 16 shows this to be a defining characteristic of the profile, although it is uncommon for women to use traditional methods throughout the entire 59 months or to begin their sequence as a traditional method user. It is more typical that women adopt a traditional method after a period of not using any method or after experiencing a pregnancy, with traditional method use concentrated in the middle and later portions of the women's sequences. Although women often experience a pregnancy before using a traditional method, the sequence index plot also reveals that it is not usual for traditional methods to be an immediate postpartum method. Instead, it is used after an episode of postpartum non-use. Use of other contraceptive methods is rare in this profile.

Figure 16   Full sequence index plot, Profile 6: Traditional Mother

Traditional Mother
n=308 (2%)

Calendar month

Legend:
- No use
- LAPM
- Short-term modern
- Traditional
- Pregnancy/Birth/Termination
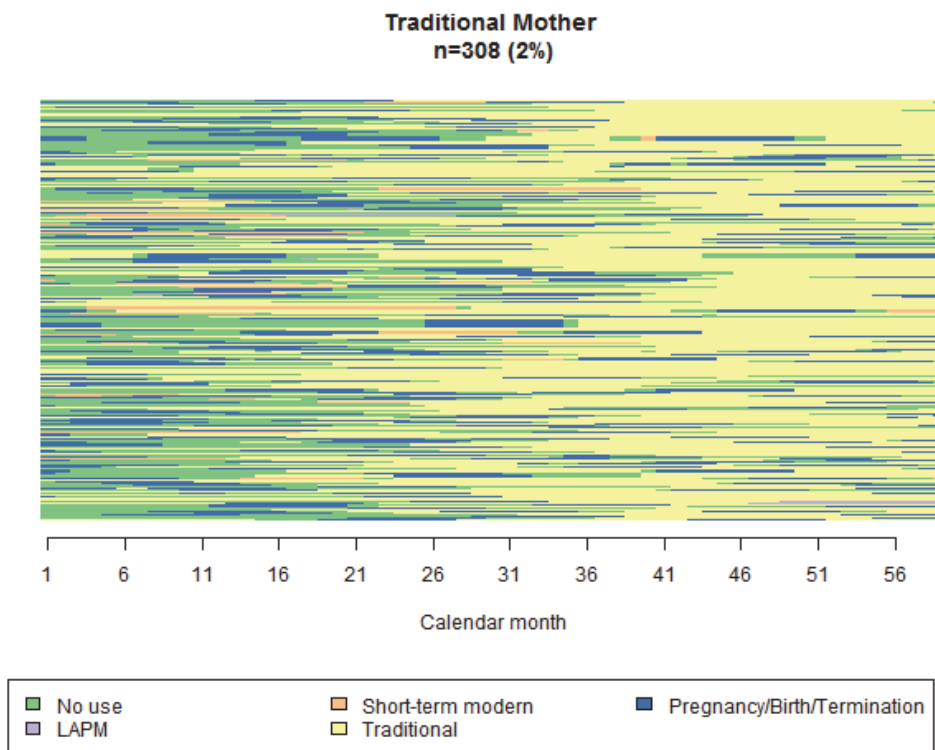
Figure 17 shows that women in this profile spend an average of 34 months using traditional methods, whereas less than 1 month was spent in this state in each of the other profiles. Traditional Mothers spend 13.5 months using no contraceptive method and 10 months in pregnancy, which is more than the other two profiles characterized by contraceptive use. On average, 1 month is spent using short-term, modern methods and less than half of a month using LAPMs, which reiterates the findings presented in the index plot. The density plot can be found in Appendix Figure A1.

Figure 17   Mean time spent in each state, Profile 6: Traditional Mother

Traditional Mother
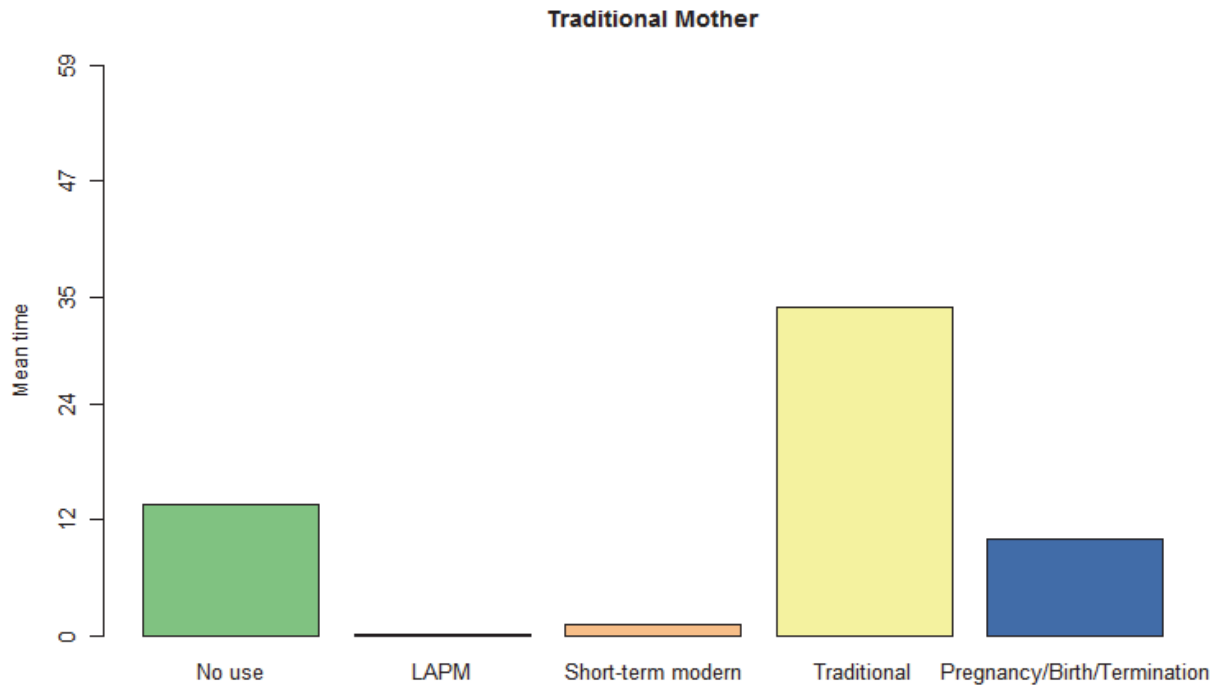
3.4 Distribution of Profiles at Different Ages of the Life Course

Women are unlikely to experience the same contraceptive profile at each point of their lives. Rather, contraceptive and pregnancy experiences are dynamic. Figure 18 shows the percent distribution of the six profiles across each age group.

Figure 18 **Prevalence (percent distribution) of Burundi contraceptive profiles by age at start of the calendar sequence**
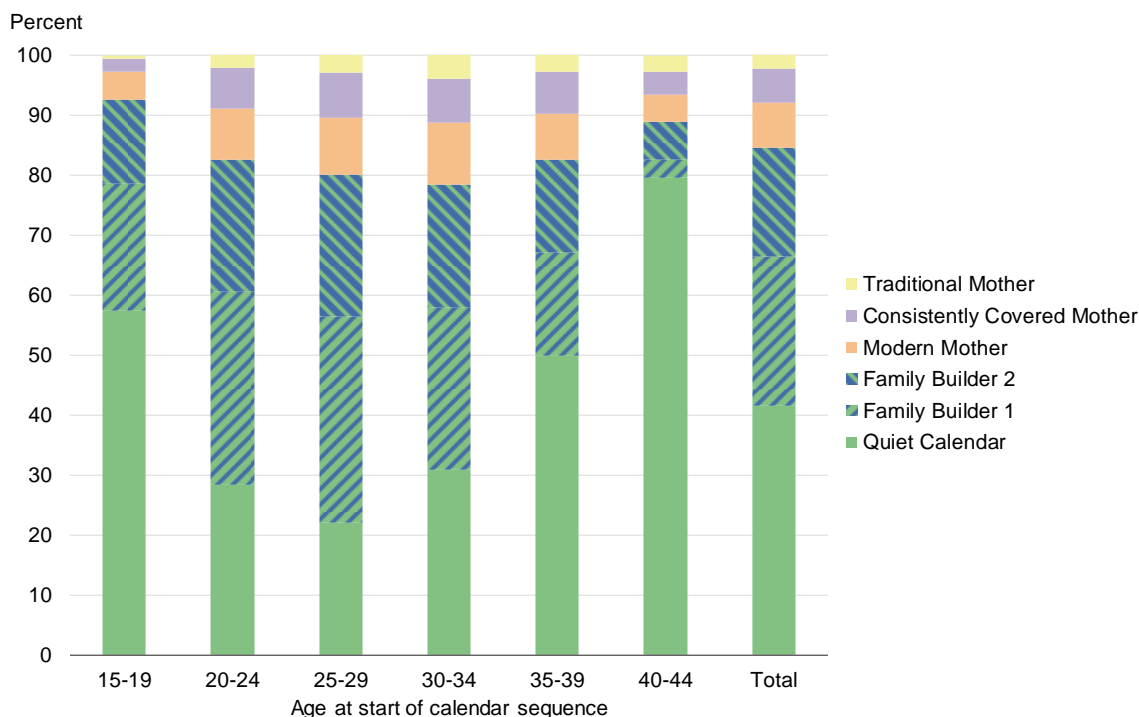
Figure 18 indicates that the Quiet Calendar, the most common profile, is highly prevalent among women age 15-19 at the start of the calendar sequence. Nearly 6 in 10 women of this age group are members of this profile of non-users. The prevalence of the Quiet Calendar declines over the next two age groups, at which point (age 30-24) prevalence increases again. The prevalence is highest—8 in 10 women—among women age 40-44 at the start of their calendar sequences. Except for women age 20-29, more women in all other age groups belong to the Quiet Calendar profile than any other profile.

In contrast to the Quiet Calendar, the other profiles show the opposite pattern across age groups, in which there is an increase in prevalence with age until some mid or older age group, when they begin to decrease in prevalence again. Family Builders I and II reach their peak prevalence among women age 25-29, while Modern Mothers, Consistently Covered Mothers, and Traditional Mothers are most common among women age 30-34.

Among women age 15-19, the most common profile after the Quiet Calendar is Family Builder I, which consists of non-users with mid/late pregnancies (21%), followed by Family Builder II, non-users with early/mid-sequence pregnancies (14%). This age group shows the lowest prevalence of any of the three contraceptive use profiles, with Traditional Mothers, traditional method use being especially uncommon.

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Among women age 20-24 and 25-29, a majority fall into Family Builder I or II, with Family Builder I slightly more common. In fact, Family Builder I is the most common profile in these age groups. While the prevalence of any of the three contraceptive use profiles is still low, they do increase. Combined, they make up 18% and 20% of the women age 20-24 and 25-29, respectively.

Among women age 30-34, the proportion of women in the Family Builder I and II profiles who do not use contraception and experience pregnancies declines to 47%, combined, as the percent in the Quiet Calendar not using and avoiding pregnancy grows. Nearly one in four women in this age group are in one of the three contraceptive use profiles, with Modern Mothers, short-term use (10%) outpacing Consistently Covered Mothers—LAPM use (7%).

Among women age 35-39 at the start of the sequences, there are even fewer women in Family Builder I and II (33% combined). However, there is a reduction in each of the three contraceptive use profiles also (17% combined). Among women age 40-44 at the start of the sequences, the Quiet Calendar profile, non-users avoiding pregnancy, has largely displaced all other profiles. A minority of women experience pregnancies as members of either Family Builder I (3%) or Family Builder II (6%), while 3-4% fall into each of the three contraceptive use profiles.

3.5   Current Need for Family Planning and Method Mix in Each Contraceptive Profile

Up to this point, we discussed women's contraceptive profiles only in terms of the attributes of the profiles and their constituent sequences, themselves. At this point, we turn our attention to the current characteristics of the women who are members of these profiles. Specifically, we examine levels of need for family planning in Figure 19. The DHS algorithm for calculating unmet need considers contraceptive users of modern methods and traditional methods alike to have met their need for family planning (Bradley et al. 2012). In Figure 20, we present the method mix among current contraceptive users, or the contribution of each method to overall contraceptive use. This figure essentially describes the contraceptive method of women with met need—the green bar—depicted in Figure 19.

Figure 19   Current need for family planning among women in each Burundi contraceptive profile
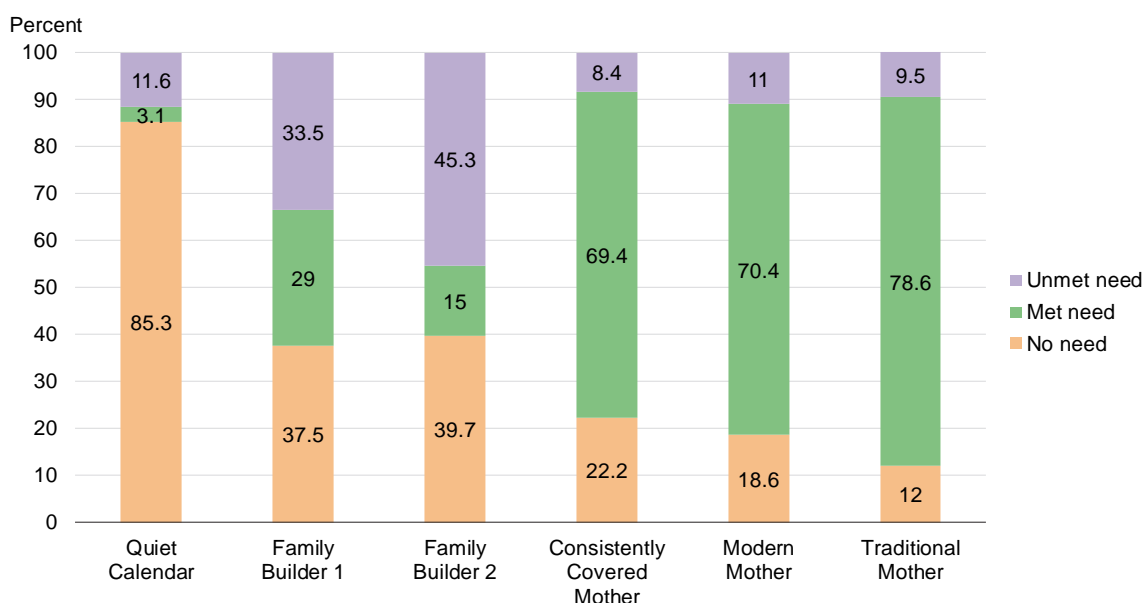
Figure 19 shows that need status varies substantially with contraceptive profile. In the Quiet Calendar profile, a large majority (86%) of women have no need for family planning and a small proportion have either unmet need or met need. Following this profile, the next highest levels of no need are found in the two Family Builder profiles. These profiles are similar to one another, with 38% having no need in the Family Builder I profile and 40% in the Family Builder II profile. However, levels of met and unmet need vary in these two profiles, which seem very similar in their makeup of sequences. Unmet need is 12 percentage points higher and met need 14 points lower in the Family Builder II profile compared with Family Builder I.

In contrast to the Quiet Calendar and both Family Builder profiles, the remaining three profiles are characterized by their high levels of met need for family planning, which range from 70% to 79% of women. Unmet need is rare among Consistently Covered Mother, Modern Mother, and Traditional Mother profiles. They vary in the proportion with no need, from a low of 12% among Traditional Mothers to 19% among Modern Mothers and 22% among Consistently Covered Mothers.

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Figure 20 indicates that there is also variation in the method mix across profiles. Although just 3% of women in the Quiet Calendar profile use contraception, these users largely use short-term, modern methods of contraception, indicated in orange shades. The most common method in this profile is injectables (30% of all use), followed by condoms (22%), implants (13%), and withdrawal (11%). The Family Builder I and Family Builder II profiles are similar to one another in their method mix, although overall contraceptive use in Family Builder I (29%) is nearly double that of Family Builder II (15%). Short-term, modern methods—and specifically injectables—are again the most common methods. Withdrawal and periodic abstinence make a slightly larger contribution to all contraceptive use in the Family Builder II profile compared with Family Builder I.

Figure 20   Current method mix among contraceptive users in each Burundi contraceptive profile
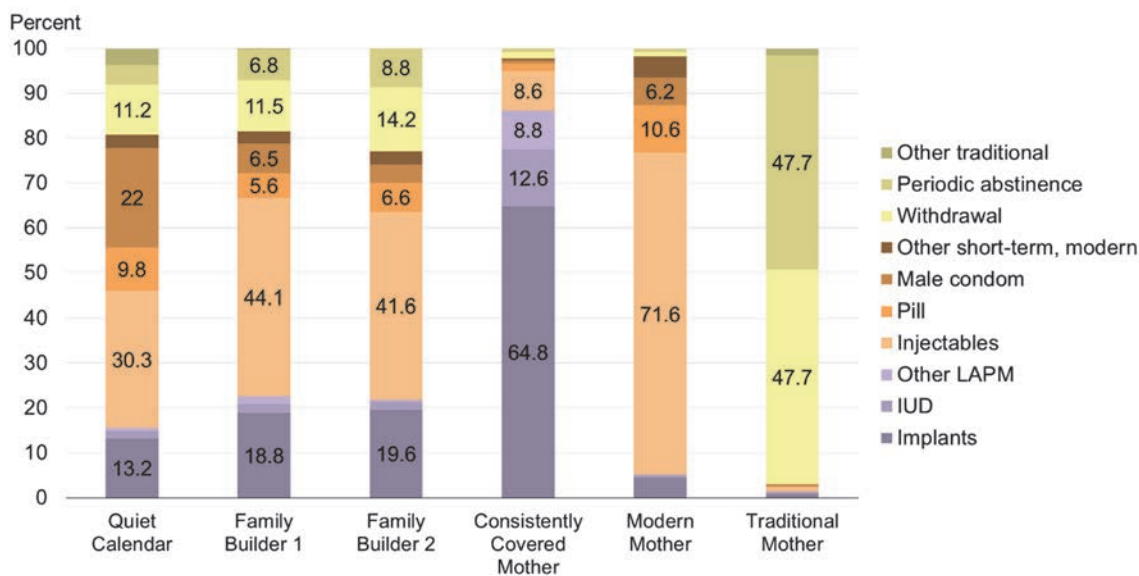
The method mix differs greatly both among the remaining three profiles and between these and the Quiet Calendar and the two Family Builder profiles. Implants dominate the method mix in the Consistently Covered Mother profile, where it accounts for 65% of all contraceptive use. This is the only profile in which a plurality of contracepting women use this method. This is followed by use of IUDs (13%), other LAPM (9%), and injectables (9%). In contrast, Modern Mothers predominantly rely on injectables (72% of contraceptive use) followed by the pill (11% of all use). Among Traditional Mothers, nearly equal proportion of use is accounted for by withdrawal and periodic abstinence (48% each). Use of other traditional methods, short-term modern methods, and LAPM is negligible.

3.6   Current Characteristics of Women in Each Contraceptive Profile across Age Groups

In the following infographics in Figures 21-26, we present the current characteristics of the women in each profile identified in Burundi, disaggregated by age.[7] The characteristics presented in these infographics are a sampling of all available characteristics and cover (1) socioeconomic status indicators, (2) relationship status indicators, (3) current need for family planning and contraception indicators, and (4) fertility and fertility preference indicators. (See Appendix Tables A3-A8 for details of all characteristics.) The characteristics selected for display are descriptive of that profile. For each 10-year age range, we select salient features of women at that stage of the life course. For women who are age 15-24 at the start of their calendar sequences, these are typically indicators relating to entry into relationships. We often select indicators related to unmet need for family planning and contraceptive use for women age 25-34 and indicators related to fertility and fertility preferences for those age 35-44.

There are far more indicators in Appendix Tables A3-A8 (and even more in DHS datasets) than can easily be presented in a static print infographic such as the ones in the following pages. These data lend themselves well to an interactive experience on an online dashboard. This would allow the user to choose from the menu of available characteristics to examine each identified contraceptive profile (overall or by age) along dimensions of interest to the user. Interactive flexibility to select the same or different characteristics for each age group would allow the user to further describe how the identified contraceptive profiles manifest across the life course or to compare among profiles in Burundi. Extending these analyses to more surveys would facilitate comparison of Burundi profiles with those of other countries.

The characteristics in these infographics are current measures, captured at the time of the survey. Because these characteristics follow, rather than precede, the sequences by which the women were sorted into profiles, no causation is implied. Furthermore, because we are disaggregating women by age rather than following them throughout their entire reproductive lives, these data should not be interpreted as portraying the exact life path taken by individual women in these profiles.

Three characteristics that appear to differentiate women in the Quiet Calendar profile from the other profiles at younger ages are education, marriage, and sexual activity. There is a greater proportion of women in the Quiet Calendar age 15-24 at the beginning of their calendar sequences who have completed secondary education or higher (51%) compared to young women in other profiles.

The majority (69%) of Quiet Calendar women age 15-24 are not married and 55% of them have never had sex. In contrast, in the remaining 5 profiles roughly 9 in 10 women are married and all women have ever had sex.

At the two older age ranges (25-34 and 35-44), a similar proportion of women in the Quiet Calendar and Family Builder I and II profiles want no more children. Women in the Family Builder profiles are more likely to currently experience unmet need for family planning.

While similar levels of Modern Mothers and Traditional Mothers age 15-24 want another child soon, young Traditional Mothers are more likely to want another child after two or more years (70%) than Modern

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[7] Age is expressed as women's age at the start of their calendar sequence.

Mothers (57%) and young Modern Mothers are more likely to want no more children (19%) than Traditional Mothers (10%). Consistently Covered Mothers age 25-34 are more likely to say that the ideal number of children is three, although this ideal is higher among Modern and Traditional Mothers (4 to 5 children). However, all women age 35-44 are similar in the number of children they have (roughly 2 in 3 women have 6 or more children) and desire no more children (93%-94%), regardless of whether they are Modern, Consistently Covered, or Traditional Mothers.

Figure 21 Current characteristics of women in the Quiet Calendar profile, by age group at start of calendar sequence

CHARACTERISTICS OF THE QUIET CALENDAR BY AGE

2016-17 BURUNDI DHS

AGE 15-24

Education
Percent distribution of women age 15-24 by highest level of education attended

51 — Secondary or higher
29 — Primary
20 — No education

55% of women age 15-24 have never had sex

Marital Status
Percent distribution of women age 15-24

Divorced, separated, widowed 6%
Married 25%
Never married 69%

AGE 25-34

44% of women say the ideal number of children is **4 to 5**

Unmet Need for Family Planning
Percent distribution of married women age 25-34

28 — Unmet need
5 — Met need
66 — No need

55% of women age 24-34 are married

AGE 35-44

Education
Percent distribution of women age 35-44 by highest level of education attended

5 — Secondary or higher
21 — Primary
74 — No education

56% of women age 35-44 have **6+** children

87% of women want no more children

Figure 22 **Current characteristics of women in the Family Builder I profile, by age group at start of calendar sequence**
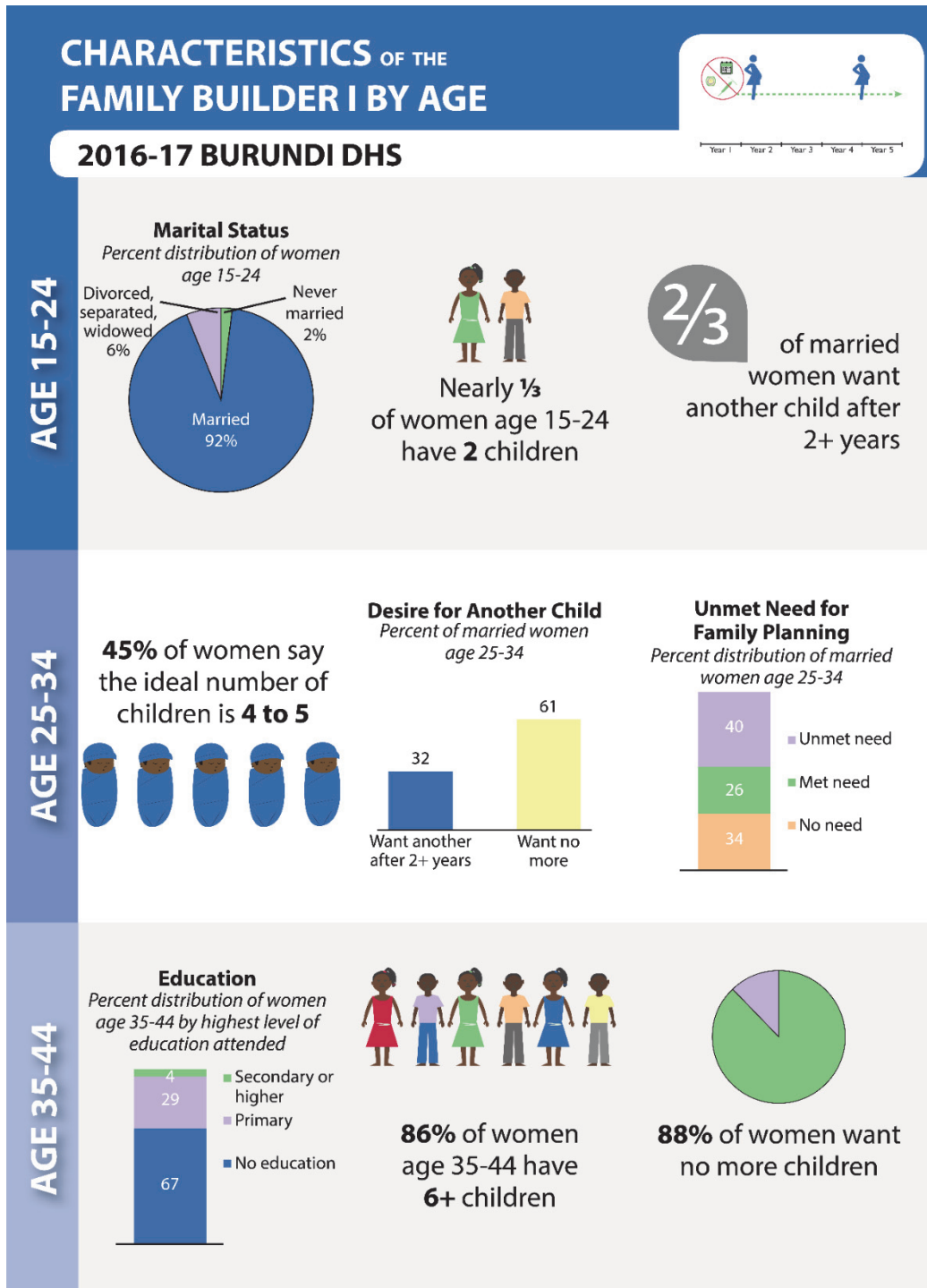
Figure 23   Current characteristics of women in the Family Builder II profile, by age group at start of calendar sequence
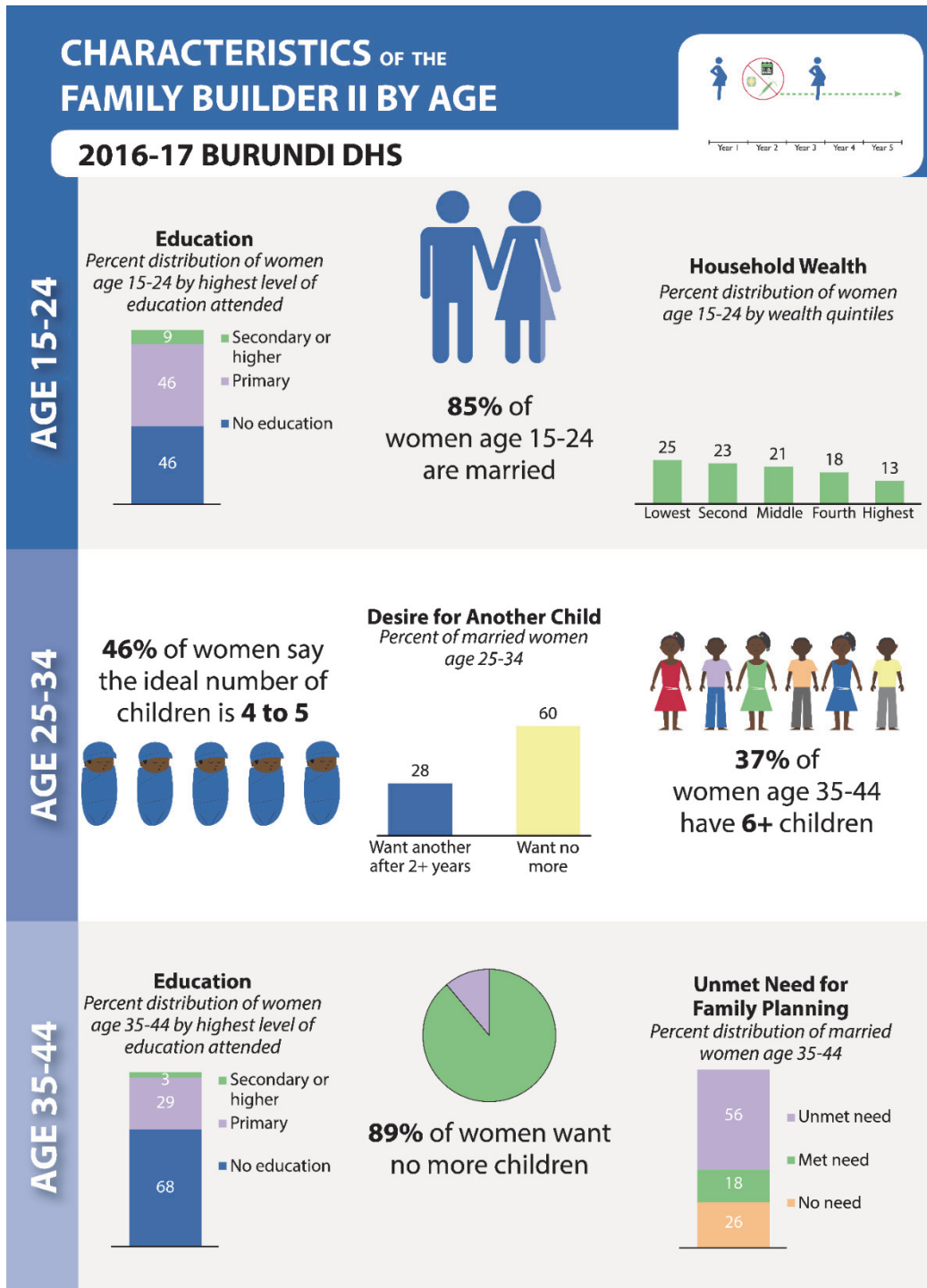
Figure 24   Current characteristics of women in the Modern Mother profile, by age group at start of calendar sequence

CHARACTERISTICS OF THE
MODERN MOTHER BY AGE

2016-17 BURUNDI DHS

AGE 15-24

89% of women age 15-24 are married

Desire for Another Child
Percent distribution of women age 15-24

Want another, unsure when 4%
Want no more 19%
Want another soon 20%
Want another after 2+ years 57%

Family Planning
Percent of women age 15-24 by currently used method

None 35
LAPM 7
Short-term modern method 56
Traditional method 2

AGE 25-34

44% of women say the ideal number of children is 4 to 5

Residence
Percent of women age 25-34

Urban 23
Rural 77

Unmet Need for Family Planning
Percent distribution of married women age 25-34

Unmet need 13
Met need 72
No need 15

AGE 35-44

Education
Percent distribution of women age 35-44 by highest level of education attended

Secondary or higher 10
Primary 32
No education 58

93% of women want no more children

Family Planning
Percent of women age 35-44 by currently used method

None 19
LAPM 14
Short-term modern method 61
Traditional method 7

Figure 25   Current characteristics of women in the Consistently Covered Mother profile, by age group at start of calendar sequence

Figure 26   Current characteristics of women in the Traditional Mother profile, by age group at start of calendar sequence

CHARACTERISTICS OF THE
TRADITIONAL MOTHER BY AGE

2016-17 BURUNDI DHS

AGE 15-24

49% of women age 15-24 have **2** children

Desire for Another Child
Percent distribution of women age 15-24

Want no more 10%
Want another, unsure when 2%
Want another soon 18%
Want another after 2+ years 70%

47% of women say the ideal number of children is **3**

AGE 25-34

Education
Percent distribution of women age 25-34 by highest level of education attended

24 — Secondary or higher
44 — Primary
31 — No education

Desire for Another Child
Percent of married women age 25-34

30 — Want another after 2+ years
58 — Want no more

36% of women age 25-34 have **6+** children

AGE 35-44

Residence
Percent of women age 35-44

28 — Urban
72 — Rural

66% of women age 35-44 have **6+** children

93% of women want no more children

4 NEPAL

4.1 Setting

Nepal is also among the 69 countries with commitments under FP2020. Nepal has experienced a marked and steady decline in TFR from 4.6 children per woman in 1996 to 2.3 in 2016 (Ministry of Health - MOH/Nepal, New ERA/Nepal, and ICF 2017). Demand for family planning has increased from 61% to 76% over this time, as has the prevalence of modern contraceptive methods and, to a much lesser extent, use of traditional methods. However, Nepal has also experienced a short-term decrease in demand for modern methods between the 2006 NDHS and 2016 NDHS, which seems inconsistent with long-term trends in unmet need and fertility.

One explanation is the substantial level of male migration for labor in Nepal. Research has shown that women with husbands who have been away for at least one year had much lower fertility than women who were living with their husbands (Khanal et al. 2013), and that spousal separation is the most important proximate determinant that explains the decline in fertility between 2006-2016 (Prakash, Pandey, and Bietsch 2019). Estimates of unmet need that do not adjust for male migration may overstate unmet need because some married women may not have a need for family planning due to their husbands not being co-resident (Khanal et al. 2013; Prakash, Pandey, and Bietsch 2019).

Nepal is one of a few countries in which female sterilization dominates the method mix. India, Sri Lanka, Honduras, and Nicaragua are among the others (Scoggins et al. 2018). Female sterilization accounts for 34.8% of all modern method use in Nepal, followed by injectables (20.7%), male sterilization (12.6%), pills (10.5%), and condoms (9.9%) (Avenir Health 2018b). LARCs are still a small part of the method mix, although use of implants has increased nearly 400% during the past 10 years (Scoggins et al. 2018).

Analysis conducted by Avenir Health that compared 2016 NDHS data on the ideal number of children and mCPR concluded that at the national level, demand for contraception was not limiting growth in the mCPR, although there may be limits for select subgroups. Opportunities for growth in mCPR may exist among youth and adolescents, particularly married youth (Avenir Health nd; Track20 2018b). Thus, identifying and addressing barriers to family planning access among adolescents and other vulnerable groups is one of Nepal's FP2020 commitments (Track20 2016).

Among the country's other commitments to the FP2020 initiative are commitments to improve the policy environment for family planning in Nepal. These include changing the regulatory framework to better support public-private partnerships; improving communication strategies to reach those with high unmet need, particularly young people; and repositioning family planning as a means to foster sustainable socioeconomic development (Track20 2016).

Nepal has the 7th highest 2014 FPE score (56.6%) of 16 countries in the Asia/Oceania region, which is the highest scoring region globally (Kuang and Brodsky 2016). Nepal's strong policy environment appears to be a contributing factor. Nepal scores highest, and has seen the most improvement in the policies component of the FPE index (65% in 2014), due to particularly high scores for enforcement of child marriage laws and program leadership (Track20 2016).

Nepal has articulated a Nepal Health Sector Program III (NHSP) for the 2015-20 period in which family planning is integral and, in 2018, implemented the Safe Motherhood and Reproductive Health Rights Act. This act defines reproductive rights as fundamental rights, and emphasizes that services must be made available to adolescents and persons with disabilities. The Act further provides that reproductive health services should be free of charge in public facilities (Scoggins et al. 2018).

Further FP2020 commitments include expanding access to modern contraceptives, increasing the method mix offered throughout different levels of the health care system, and strengthening the quality of family planning information and services at service delivery points (Track20 2016). Nepal scores slightly lower—55%—in the services component of the FPE (Track20 2016).

United Nations Population Fund (UNFPA) data indicate that stockouts were rare in 2017 at Nepal's primary health facilities, and slightly higher at secondary and tertiary facilities (Scoggins et al. 2018). The national 2015 Nepal Health Facility Survey (NHFS) indicated that 98% of facilities offered at least one temporary modern method and 97% of facilities offered at least three methods (Ministry of Health/Nepal et al. 2017). Pills, condoms, and injectables are the most common methods offered. However, just under half of facilities had either or both implants and IUDs available. These findings are reflected by trends in FPE index scores. The inclusion of new items in the accessibility component of the 2014 FPE, which include access to implants, EC, and insertion and removal of IUDs or implants, reduces the accessibility score from 58% to 54% (Track20 2016).

Overall, although 88.5% of interviewed family planning clients reported feeling satisfied with their services in the NHFS (Ministry of Health/Nepal et al. 2017), these data do not align with other similar data about family planning services received. For example, FP2020 finds that less than half of contraceptive users (43%) received all three pieces of information that make up the method information index (MII): information about other methods, side effects, and actions to take in case of side effects (Scoggins et al. 2018). The NHFS found that method-specific side effects were discussed only in about one in five family planning consultations that were observed in the study (Ministry of Health/Nepal et al. 2017). The NHFS identified other quality concerns. The physical environment for family planning counseling was often poor, with visual and auditory privacy assured in only 6% of observed consultations. Only 16% of interviewed family planning service providers had received in-service training in the 24 months before the survey, and just over 1 in 10 had ever received in-service training on LAPMs.

Within the 2014 FPE components, domestic funding of the family planning budget was found to be weak (Track20 2016). Nepal made approximately $2,230,000 in domestic government expenditures on family planning in 2016, according to estimates by the UNFPA/NIDI Resource Tracking Project on Family Planning Expenditures (Scoggins et al. 2018). In addition to policy and service improvement commitments to FP2020, Nepal is committed to implementing their 2015-2020 Costed Implementation Plan on Family Planning within the NHSP, increasing family planning funding by at least 7% annually during its implementation, and raising additional resources by engaging other sectors and international partners.

4.2   Sample Description

We exclude 2,675 (20.8%) women who are younger than age 15 at the start of their sequences, leaving 10,187 weighted cases. The characteristics of this sample are described in Table 3, and details of the sample disaggregated by age group can be found in Appendix Table A2.

Table 3   **Nepal sample description: Percent distribution and means of sociodemographic characteristics of respondents (n=10,187)**

	%	N
Age at start of calendar		
15-19	22.3	2,274
20-24	20.5	2,092
25-29	17.8	1,814
30-34	15.3	1,556
35-39	13.5	1,378
40-44	10.5	1,074
Type of place of residence		
Urban	63.1	6,428
Rural	36.9	3,759
Highest education level		
No education	40.4	4,115
Primary	17.6	1,792
Secondary+	42.0	4,280
Household wealth quintile		
Poorest	16.3	1,658
Poorer	19.5	1,991
Middle	20.0	2,038
Richer	21.2	2,162
Richest	23.0	2,339
Ever had sex		
No	7.4	751
Yes	92.6	9,436
Mean age at 1st sex (among those who have ever had sex)		
Mean	17.9	9,436
Marital status		
Never in union	7.5	760
Currently in union/living with a man	89.5	9,119
Formerly in union/living with a man	3.0	308
Husband/partner's residential status		
Living with her	66.6	6,072
Staying elsewhere	33.4	3,047
Marital duration		
Never married	7.5	760
0-4	13.0	1,325
5-9	17.4	1,769
10-14	16.4	1,674
15-19	15.8	1,606
20-24	14.2	1,442
25-29	10.5	1,066
30+	5.4	545

Continued…

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Table 3—*Continued*

	%	N
Children ever born		
0	13.5	1,372
1	17.3	1,765
2	26.9	2,736
3	18.8	1,916
4	11.1	1,132
5	6.2	635
6+	6.2	631
Fertility desires		
Wants within 2 years	8.2	837
Wants after 2+ years	10.3	1,044
Wants, unsure timing	8.6	873
Wants no more/sterilized/infecund	73.0	7,432
Ideal number of children		
0	1.4	139
1	11.5	1,169
2	63.2	6,434
3	18.1	1,841
4-5	5.3	538
6+	0.2	25
Non-numeric response	0.4	42
Type of contraception currently used		
Not using	50.3	5,125
LARC/permanent method	28.7	2,927
Short-term modern method	12.1	1,235
Traditional method	8.8	900
Unmet need among currently married women		
No need	22.1	2,020
Unmet need	22.9	2,084
Met need	55.0	5,015

As in Burundi, the analytic sample is relatively young. There are more women age 15-19 and age 20-24 (43% combined) than in the oldest three age groups, age 30-44 combined (39%). Six in 10 women live in urban areas. Educational attainment is bifurcated in our analytic sample with approximately 40% with no education, 42% with secondary or higher education, and 18% with only primary education. The sample leans slightly wealthy, with 16% of women in the poorest wealth quintile and 23% in the richest wealth quintile.

More than 9 in 10 women have ever had sex, with a mean age of sexual debut of 17.9 among those who have ever had sex. A nearly equal proportion of women—90%—are currently married. Just 8% have never married and 3% are currently separated, divorced, or widowed. One-third of married women are not co-resident with their husband. Women are approximately even across categories of marital duration. More than a quarter of women (27%) have two children, with the modal response in a normal distribution. A small proportion of women have 5 or 6 or more children.
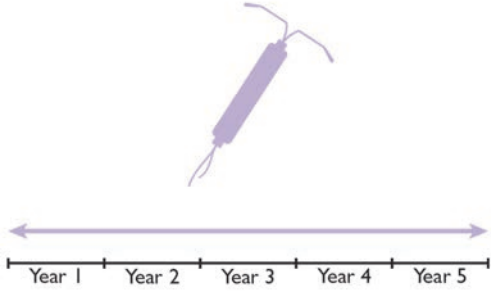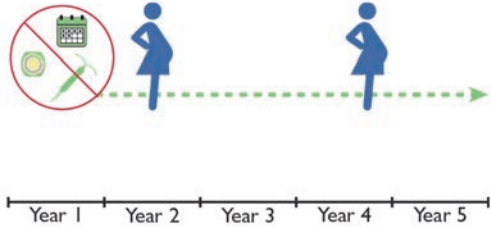
With fertility desires, 73% of women reported that they do not want more children, and another 10% reported wanting another child after 2 or more years. The ideal number of children is two children for a

majority (63%) of women. Half of all women are not using any method of family planning, while 29% are using LAPM. Nearly equal proportions of women have no need (22%) or unmet need (23%) for family planning, while 55% have met their need for family planning.

4.3 Contraceptive Profiles in Nepal
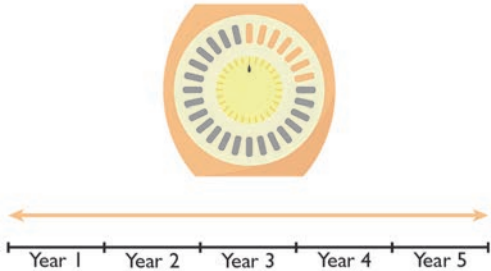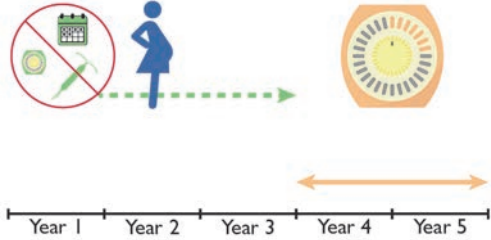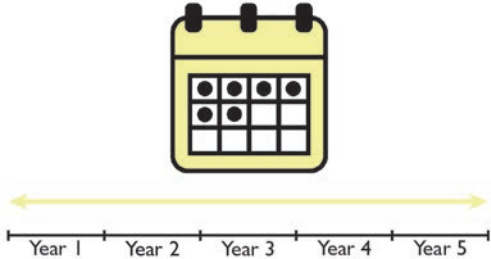
In Nepal, the more than 10,000 women in the analytic sample exhibit 4,616 distinct sequences of contraceptive and pregnancy experience. Our cluster analysis of these sequences yields six profiles of contraceptive behavior. The legend of contraceptive profiles identified in Nepal can be found in Table 4.

Table 4   Legend of contraceptive profiles identified in Nepal

Nepal Contraceptive Profiles	
Profile Visualization	**Description**
Quiet Calendar	Women who do not experience pregnancy nor use any methods.
Consistently Covered	Women who exclusively use LARC or permanent methods for the entire 5 years.
Family Builder	Women who do not use any method and experience two pregnancies, beginning at the end of Year 1 and within Year 4.

Continued…

Table 4—*Continued*

Nepal Contraceptive Profiles	
Profile Visualization	**Description**
Consistently Modern	Women who consistently use short-term modern methods and who largely avoid pregnancy.
Modern Mother	Women who adopt a short-term modern method toward the end of Year 3 after a long time period of non-use and one pregnancy.
Consistently Traditional	Women who consistently use traditional methods over 5 years.

Legend for Contraceptive Profiles in Nepal

None.

Traditional methods include rhythm, withdrawal, standard days method, or other.

Short-term modern methods include the pill, injectables, male condom, female condom, lactational amenorrhea method, and emergency contraception.

LARC or permanent methods include the implant, IUD, female sterilization, and male sterilization.

Pregnancy, birth, or termination.

Consistent use

Periodic use

The six medoids, or representative sequences that correspond to each contraceptive profile, are displayed in Figure 27. Labels for profiles have been assigned by the medoid's key features and characteristics.

Figure 27   Representative sequence (medoid) and proportions of each contraceptive profile
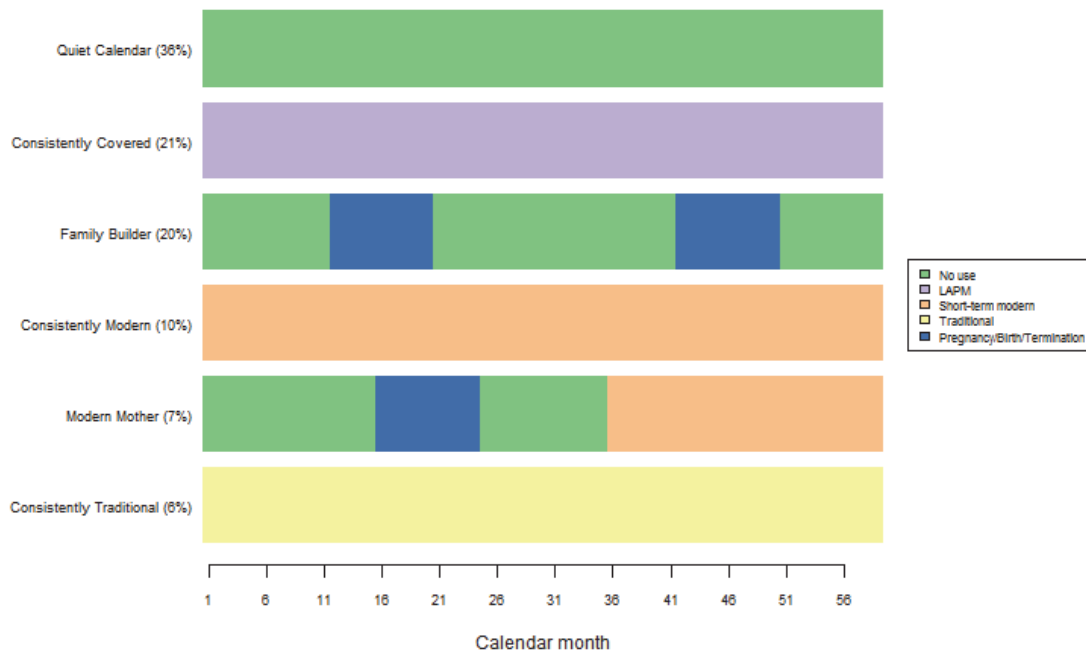
The most common profile, referred to as Quiet Calendar, is 36% of the sample in Nepal. The representative sequence for this profile shows not using any form of contraceptive method for the entirety of their calendar period, which covers a 5-year period of their reproductive health and family planning experiences prior to the date they were surveyed. This profile of predominant contraceptive non-use is followed by one referred to as Consistently Covered, which includes more than one out of five women (21%). The representative sequence for this profile indicates use of LAPM during the entire calendar sequence. In contrast to the two most common profiles, the representative sequence describing the third largest group (20%), Family Builder, shows contraceptive non-use followed by two distinct periods of a pregnancy state.

Women in the additional three profiles identified in Nepal are less than a quarter of the sample overall (ranging from 6%-10% per medoid). After the Family Builders, 10% of women are part of the Consistently Moderns, with a representative sequence in which short-term modern contraceptive methods are used for the entire 59 months. The fifth profile, referred to as Modern Mothers, is 7% of the sample. Modern Mothers, represented by its medoid, are characterized by their uptake of a short-term contraceptive method, but after an episode of contraceptive non-use, which is followed by a pregnancy and another period of contraceptive method non-use. Finally, the profile with women who use traditional methods throughout the study period, referred to as Consistently Traditional, is 6% of the sample.

Of the six profiles in Nepal, four are represented by a medoid sequence with a single state of family planning behavior: contraceptive non-use, LAPM use, short-term modern method use, and traditional method use. The two remaining profiles begin with periods of contraceptive non-use, and then are punctuated by at least

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one period of a pregnancy, and followed by at least one more period in the contraceptive method non-use state. The difference between the two remaining medoids is that one adopts a short-term modern method, which replaces an additional experience of pregnancy, in conjunction with not using any contraception.

4.3.1   Profile 1: Quiet Calendar

Figure 28 (below) plots full sequences for the sample that can be represented by the medoid, Quiet Calendar, in Nepal. To complement Figure 27 above, which displays the medoids and weighted proportions from the six profiles, the sequence index plot in Figure 28 illustrates greater nuance as well as variation among all women in the profile than the medoid alone. Among all sequences for Quiet Calendar women, the dominant color is green, which corresponds to a woman who generally does not use a contraceptive method. Within this full sequence index plot, there are traces of blue, orange, and yellow, which are markers for other states of family planning and reproductive health behavior. For example, there are Quiet Calendar women who become pregnant, give birth, or experience a termination (blue). In addition, some women take up short-term modern contraceptive methods (orange) and traditional methods (yellow) in short episodes during the course of the 5-year calendar sequence. It appears that women use short-term methods for slightly longer episodes earlier on during the calendar sequence as well as later during the calendar period, with shorter episodes of short-term method use in the middle.

Figure 28   Full sequence index plot, Profile 1: Quiet Calendar
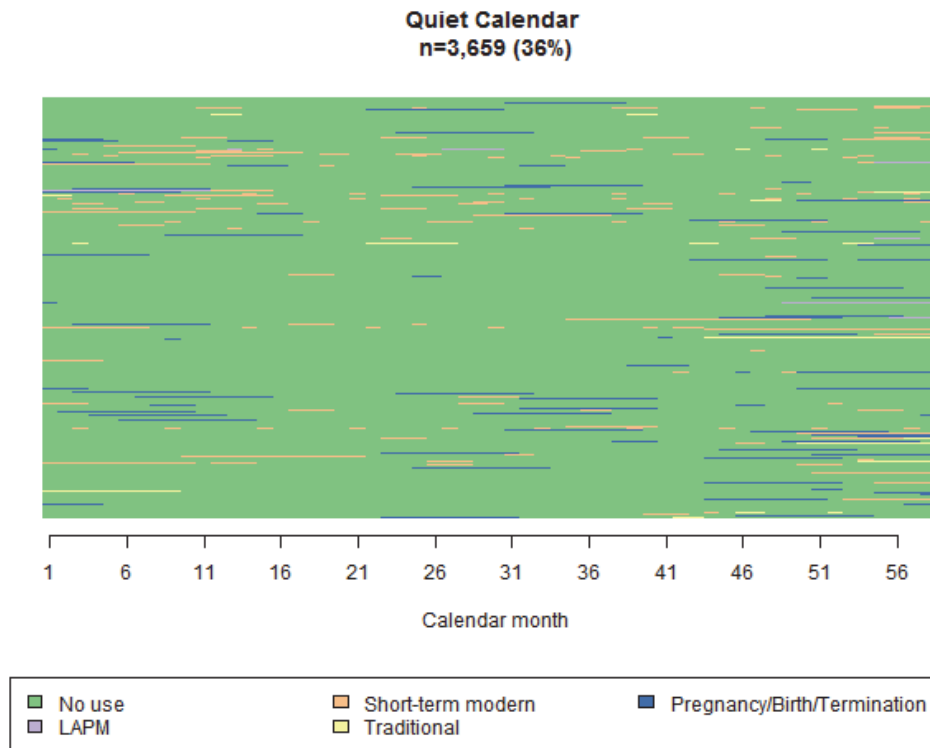
A density plot that indicates in aggregate the proportion of time spent in the six states at each month of women's sequences, for women in the Quiet Calendar profile and for each of the other profiles in Nepal, can be found in Appendix Figure A2.

Figure 29, which shows the mean time spent in each state for women in this profile, reinforces findings from the representative sequence as well as full sequence index plot. Of the 59 months, a total of 3,659 women (35.9%) in Quiet Calendar spend an average of 55 months in the contraceptive non-use state.

Figure 29   Mean time spent in each state, Profile 1: Quiet Calendar
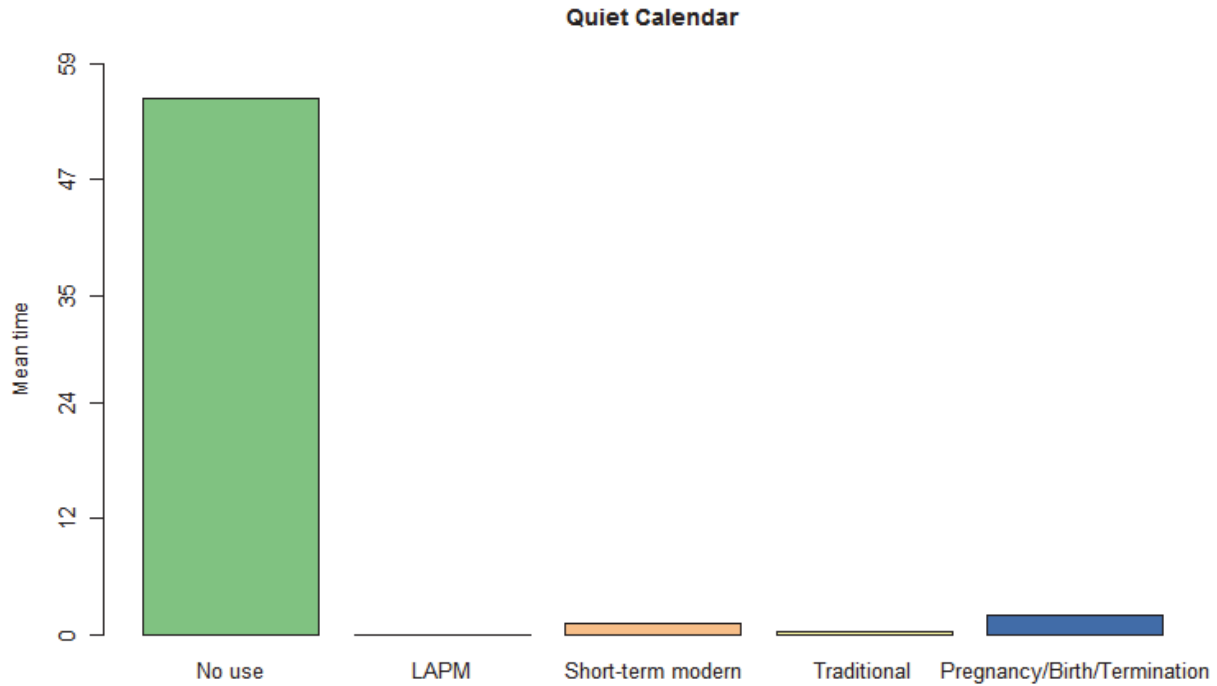
4.3.2   Profile 2: Consistently Covered

Similar to Quiet Calendars, the women in the Consistently Covered profile report experiencing one state, and in this case, this profile is characterized by use of primarily LAPMs, as shown in Figure 30. Variation at the full sequence level can be found early in the calendar sequence where a few women either use short-term modern methods, do not use any form, or experience a pregnancy, birth, or termination. There are a small number of women who use traditional methods for a few years at the beginning of their reported calendar sequence as well. Nonetheless, most women represented in the Consistently Covered profile use primarily LAPM methods. Those who started in a different state, as mentioned above, adopted a LAPM method and used it for a long period of time. For example, in terms of the pregnancy, birth, and termination state, most of these experiences take place at the beginning of a woman's 5-year calendar, which is followed by adoption of LAPMs.

Figure 30   Full sequence index plot, Profile 2: Consistently Covered
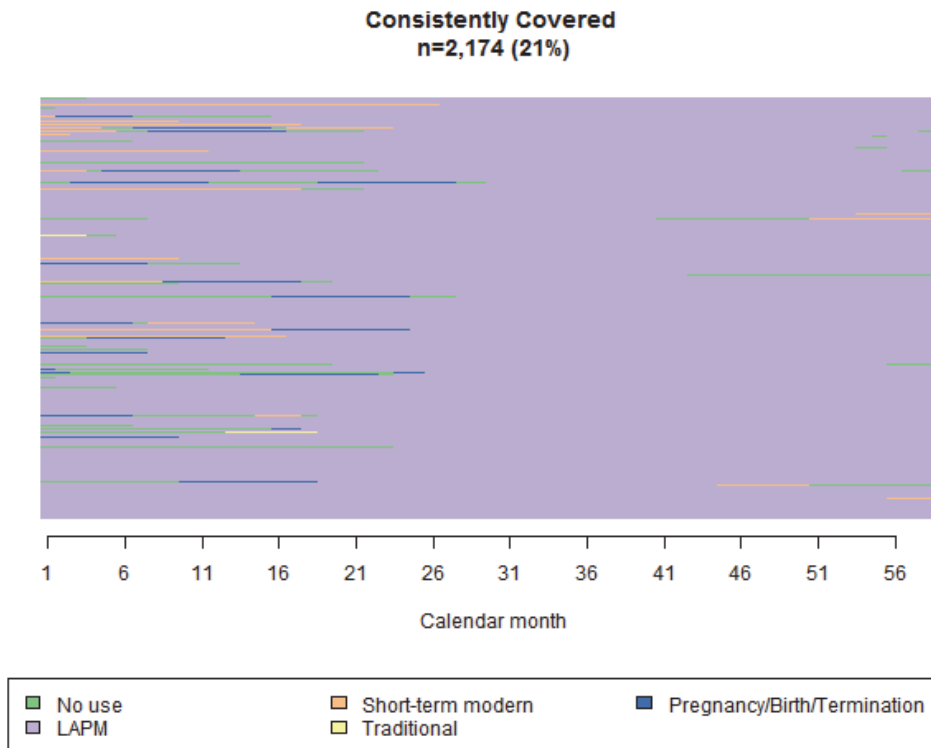
Figure 31 shows the mean time spent in each state for Consistently Covered women. On average, the 2,174 women (21.3% of the sample) in Consistently Covered spend the majority (56 months) of the 59-month period using a LAPM method, and they spend very little time in any of the other states, on average. More details can be found in the density plot in Appendix Figure A2.

Figure 31   Mean time spent in each state, Profile 2: Consistently Covered

Consistently Covered

55
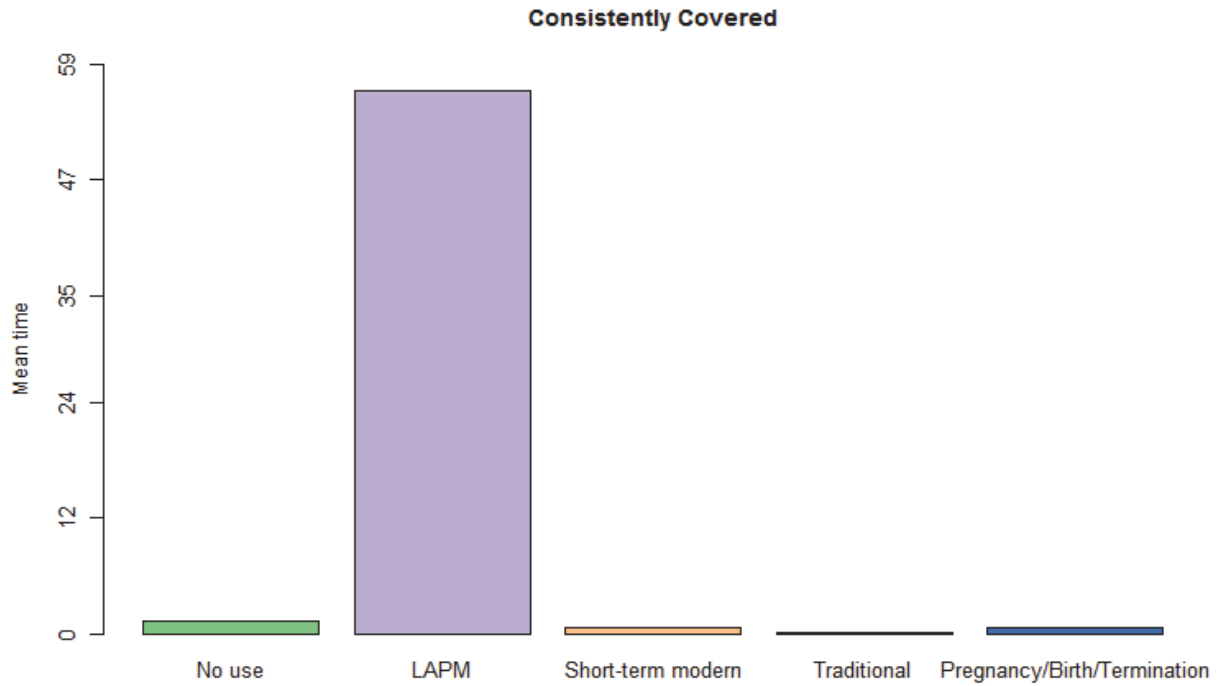
4.3.3 Profile 3: Family Builder

This profile, referred to as Family Builder, is characterized by the largest amount of time in the pregnancy, birth, and termination state compared to the other five profiles. Based on the full sequence index plot in Figure 32, women in this profile frequently switch between a pregnancy state (blue) and contraceptive method non-use (green). Unlike the Quiet Calendars and Consistently Covered women, there is more inter-sequence variation among Family Builders. Use of traditional methods later in the calendar sequence, as well as short-term modern contraceptive method use, are found throughout, although these states do not dominate the sequence index plot. Of the three most common profiles identified, Family Builders have the most varied, colorful set of full sequence index plots.

Figure 32   Full sequence index plot, Profile 3: Family Builder
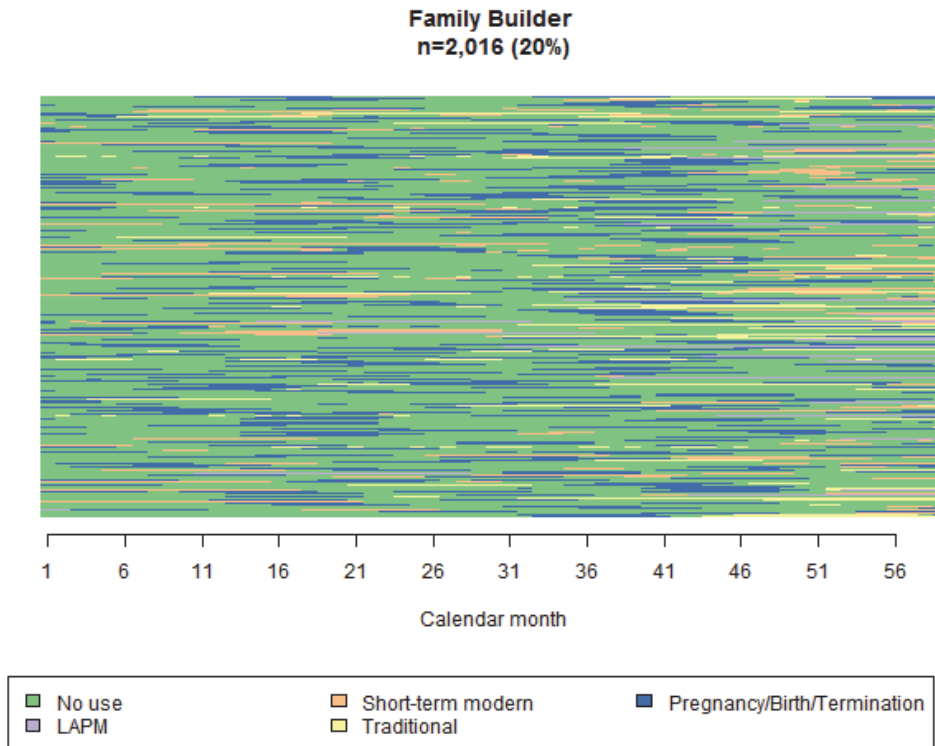
Family Builders, with a total of 2,016 women (19.8%), spend an average of 12 months in the pregnancy, birth, and termination state, as shown in Figure 33. This is the most time spent in this state among all the six profiles. Family Builders also spend more than 3 years, or 39 months, not using a form of contraception. This is the second-highest time spent in the non-use state, followed only by women in the Quiet Calendar profile. The density plot in Appendix Figure A2 provides more details.

Figure 33   Mean time spent in each state, Profile 3: Family Builder
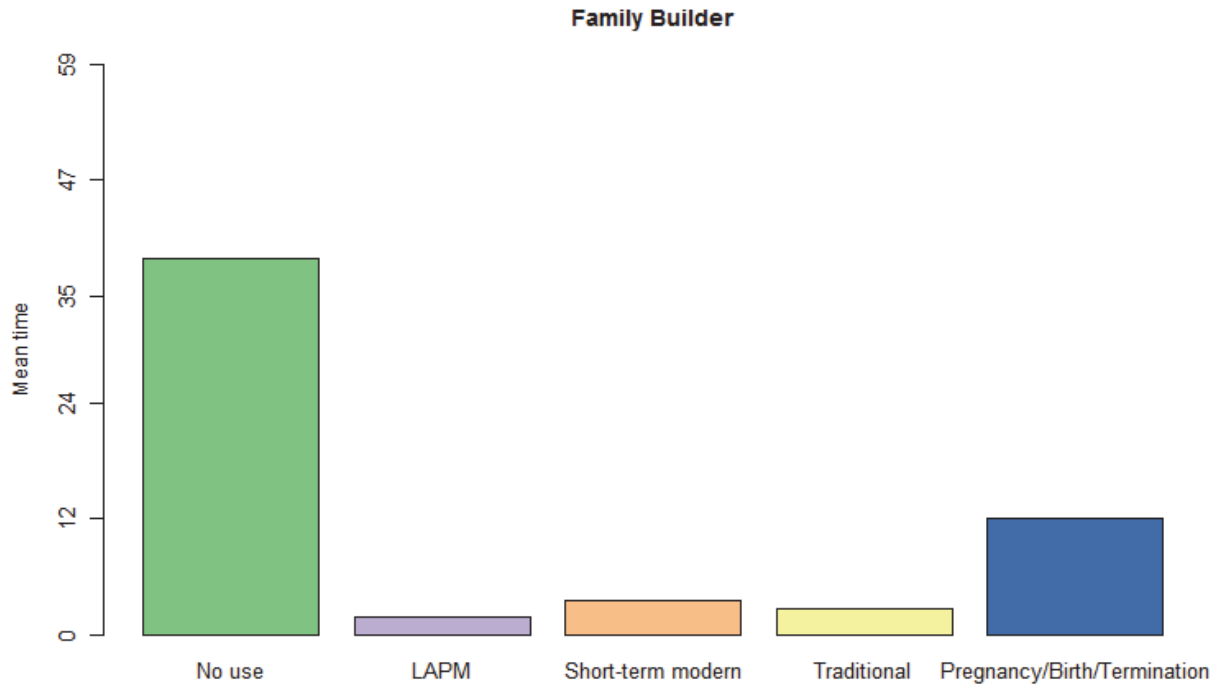
4.3.4 Profile 4: Consistently Modern

Women in Nepal whose sequences fall into the Consistently Modern profile use primarily short-term contraceptive methods in aggregate. In Figure 34, there is more intersequence variation compared to the representative pattern found in the figure that illustrates medoids (Figure 27). At the beginning of the 5-year calendar sequence, a number of women experience a state of pregnancy, birth, or termination. In addition, there are striations of pregnancies, births, and terminations throughout the study period. Of the women in this profile, some tend to either switch to a traditional method or stop any form of contraception toward the end of the reported reproductive calendar sequence. There are also women who begin their calendar sequence with contraceptive non-use before adopting a form of short-term, modern method.

Figure 34   Full sequence index plot, Profile 4: Consistently Modern
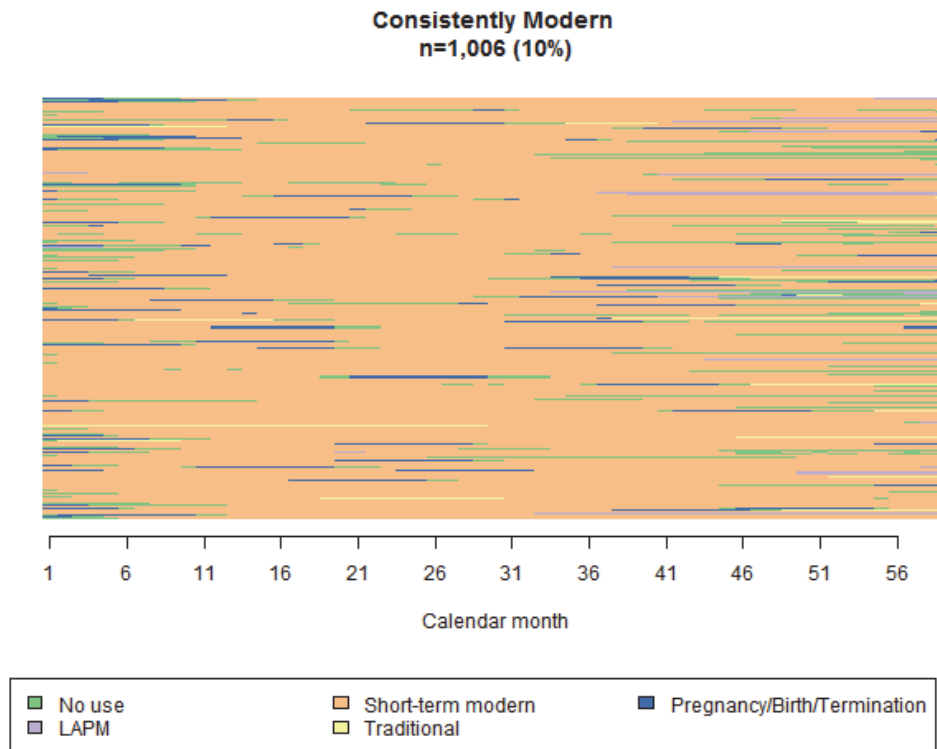
With nearly 10% of the sample, the 1,006 women in the Consistently Modern profile spend the majority of their calendar sequence (51 months) using a short-term modern contraceptive method, with 5 months in a contraceptive non-use state (Figure 35). This is far greater than women in any other profile. Women in this profile spend no more than 5 months in any of the other four states. Details of the aggregate time spent in each state at each month of this profile's sequences can be found in the density plot in Appendix Figure A2.

Figure 35 **Mean time spent in each state, Profile 4: Consistently Modern**
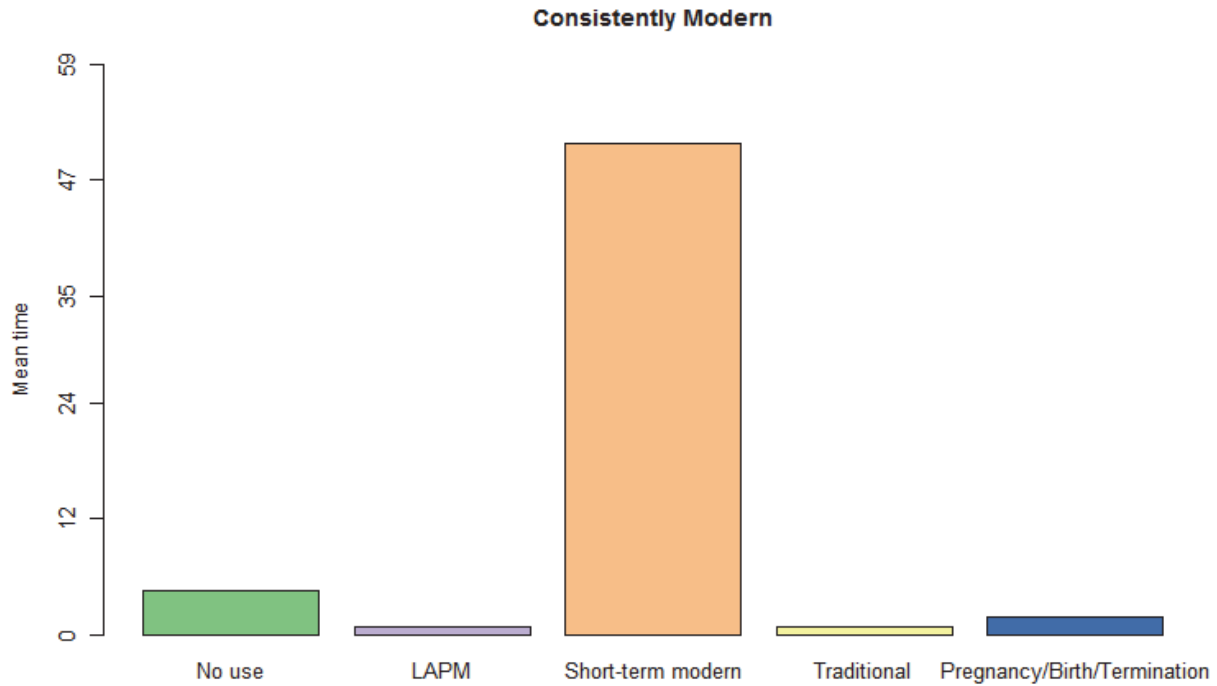
4.3.5   Profile 5: Modern Mother

According to Figure 27, Modern Mothers are 7% of the women in the Nepal sample (N=697). The medoid suggests that women in this profile can be observed as not using any form of contraception; experiencing a pregnancy, birth, or termination; or adopting short-term modern contraceptive methods. As shown in the full sequence index plot in Figure 36, most women in this profile follow the pattern shown in this representative sequence. Contraceptive non-use appears to be the most common state at the beginning of women's 5-year calendar sequence. Experiences of pregnancies, births, and terminations take place early and midway through this calendar sequence among Modern Mothers, followed by another episode of contraceptive method non-use, and then an adoption of a short-term contraceptive method for a sustained period of time.

Figure 36   Full sequence index plot, Profile 5: Modern Mother

60
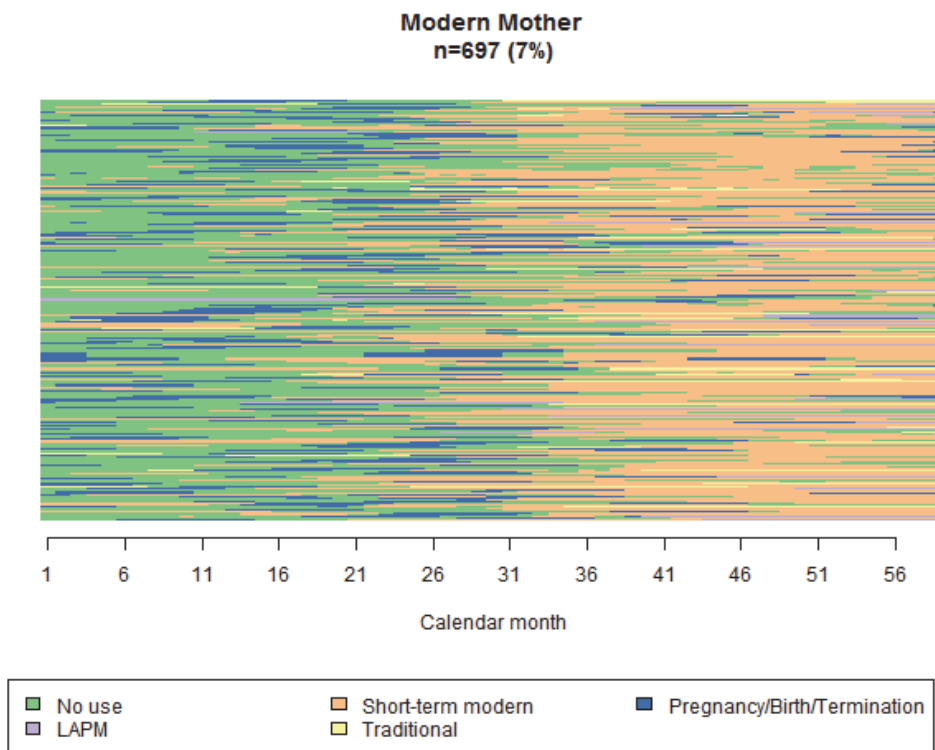
Figure 37 indicates that Modern Mothers in Nepal spend an evenly split time, on average, between a contraceptive non-use state (23 months) and short-term modern method use (24 months). The time spent in the non-use state for Modern Mothers follows that among women in the Quiet Calendar and Family Builder profiles. Only Consistently Modern women spend more time, on average, using a short-term, modern method. Women belonging to the Modern Mothers profile also experience an average 8.5 months in the pregnancy, birth, and termination state. This is the second greatest time spent in a pregnancy state, after the Family Builder profile. More details can be found in the density plot in Appendix Figure A2.

Figure 37   Mean time spent in each state, Profile 5: Modern Mother

Modern Mother
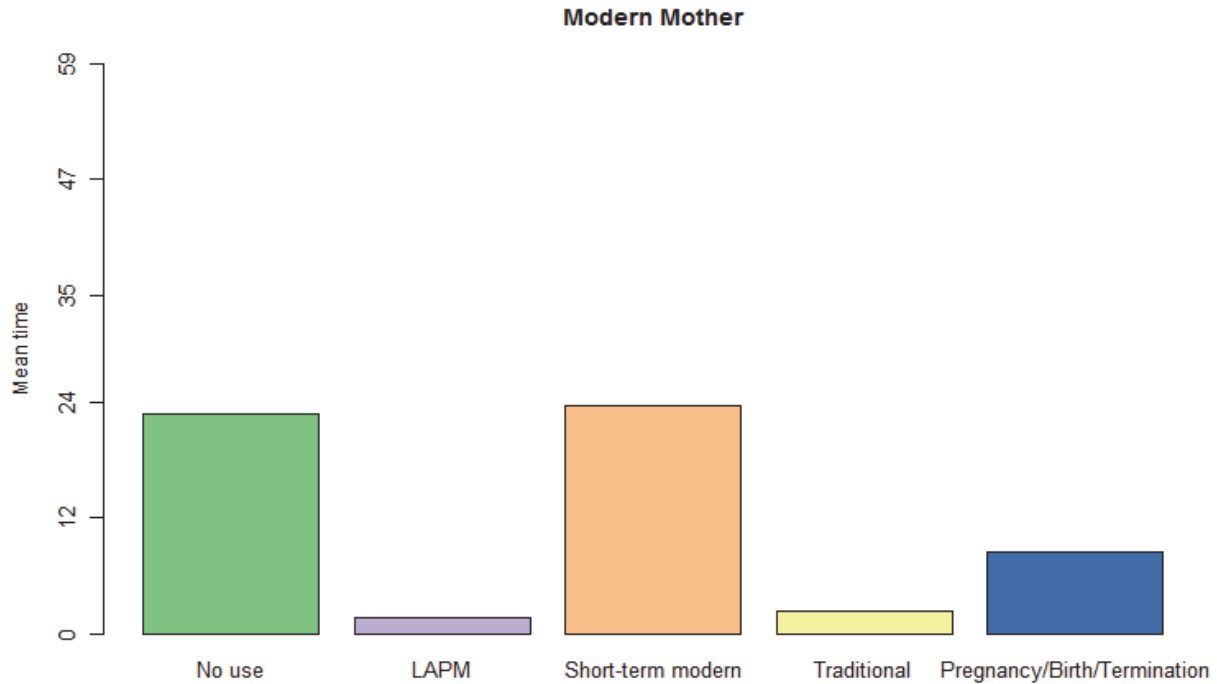
4.3.6 Profile 6: Consistently Traditional

Figure 38 displays the full sequences for Consistently Traditional women (6% of the Nepal sample), which are more varied and nuanced compared to that observed through the medoid sequence (Figure 27). The medoid shows a sequence in which traditional method use is the only state Consistently Traditional women experience. According to the sequence index plot, women in this profile display episodes of use of traditional methods at all points throughout the calendar sequence. While women are characterized in this profile by their predominant use of traditional contraceptive methods, sporadic episodes of contraceptive non-use, as well as pregnancy states, may punctuate some women's experience of traditional method use. It appears that a portion of women in this profile experience longer episodes of contraceptive non-use.

Figure 38   Full sequence index plot, Profile 6: Consistently Traditional
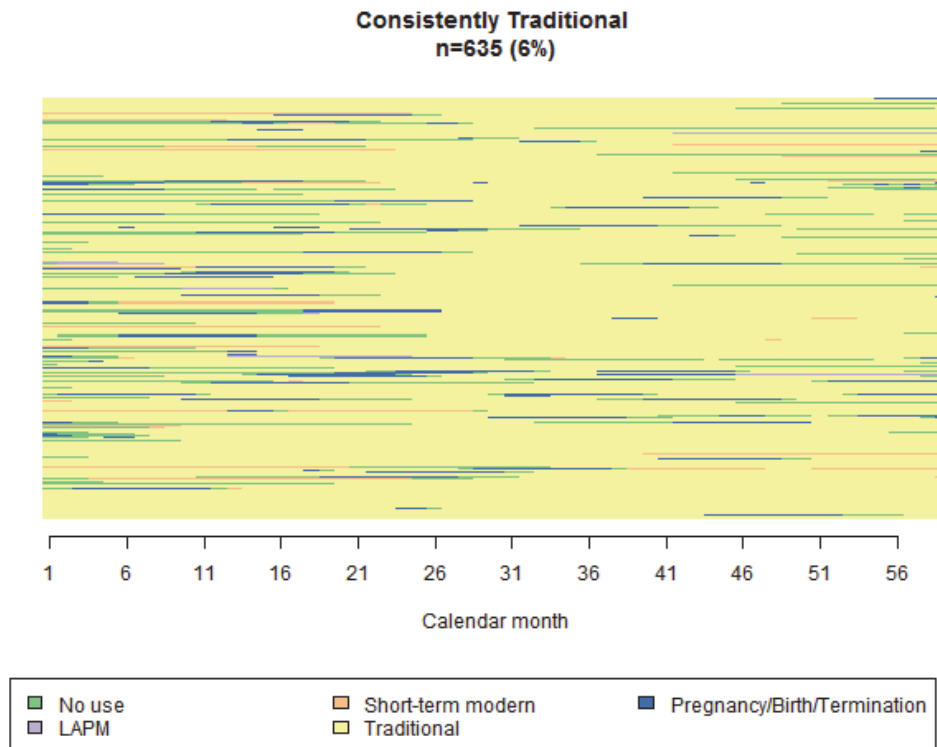
Finally, Figure 39 shows the mean time spent in each state for this profile. The sample of 635 women, known as Consistently Traditional, spend an average of more than 4 years (51 months) in the traditional method use state, followed by 4 months of contraceptive non-use. Like the women in the Quiet Calendar, Consistently Covered, and Consistently Modern profiles, women in the Consistently Traditional profile spend nearly all their time in the profile's defining state. No more than 4 months on average is spent in any other state. The density plot for this profile in Appendix Figure A2 shows more details.

Figure 39   Mean time spent in each state, Profile 6: Consistently Traditional

Consistently Traditional
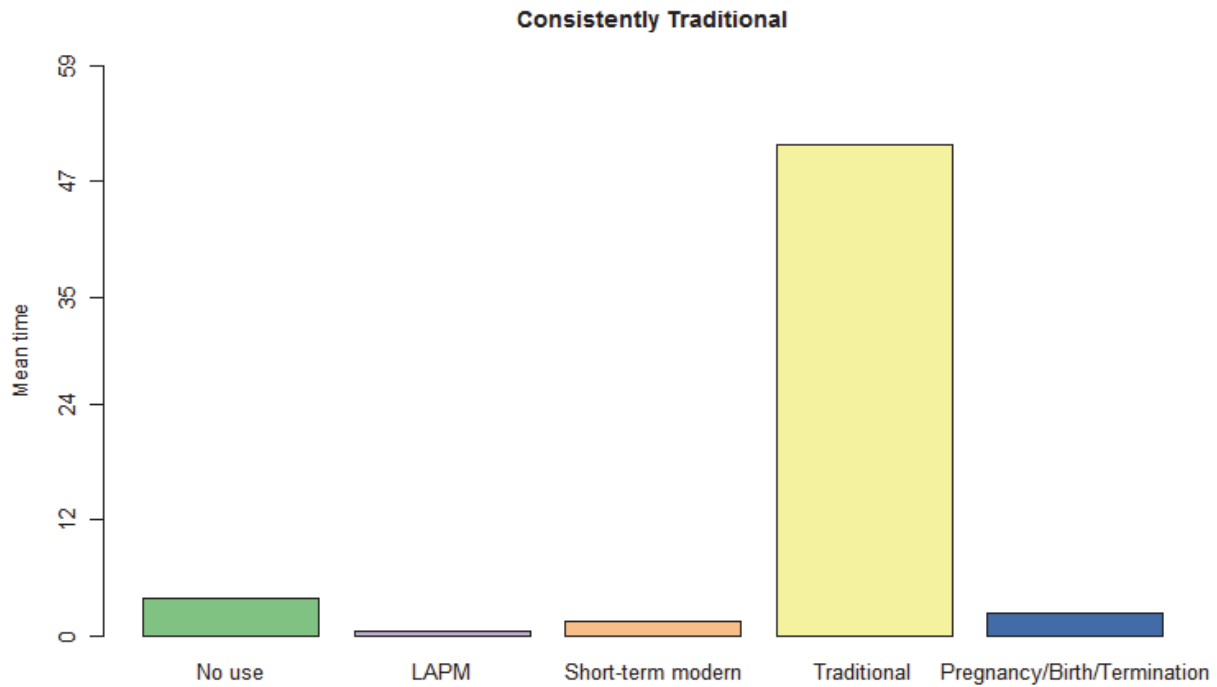
4.4 Distribution of Contraceptive Profiles at Different Ages of the Life Course

To provide further detail about the six-cluster solution identified in Nepal, Figure 40 displays the prevalence of contraceptive profiles by age group in percent distribution. The Quiet Calendar profile is most common among the youngest age group (age 15-19 at the start of the calendar sequence). After this age group, there is a noticeable downward trend in prevalence extending to those in their early thirties. The Quiet Calendar prevalence then gradually increases with age, with more than one-third of women age 40-44 belonging to this profile.

Figure 40 **Prevalence (percent distribution) of contraceptive profiles by age at the start of the calendar sequence**
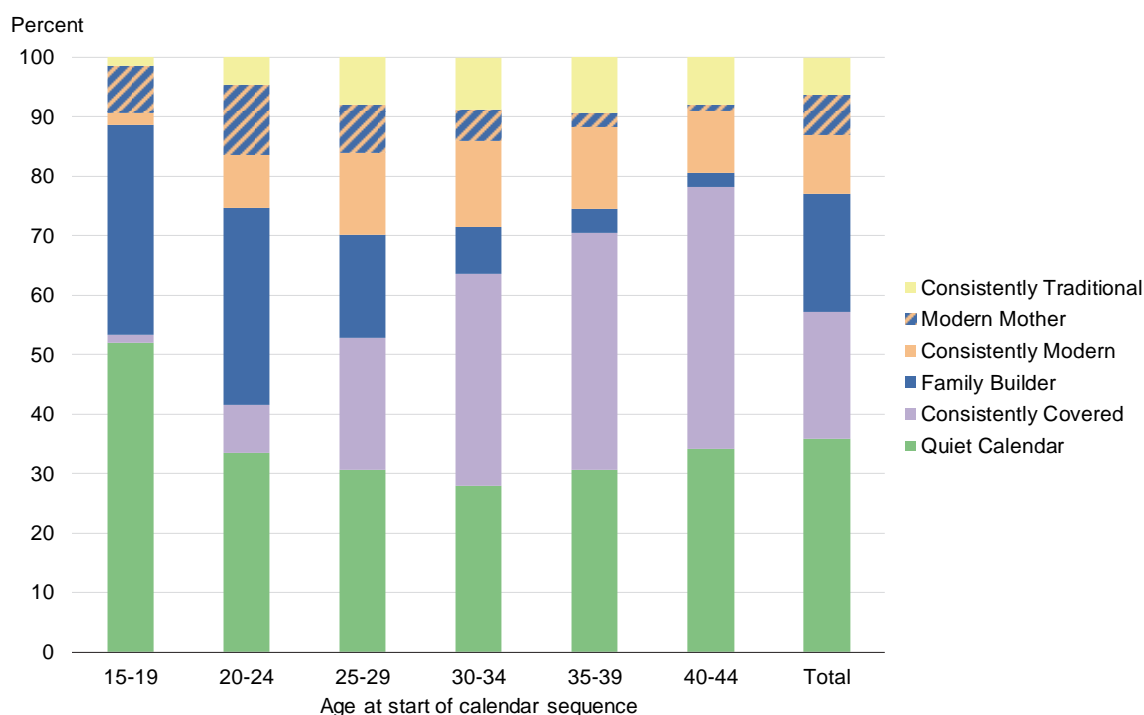
A very small portion of women age 15-19 belong to the Consistently Covered profile—just 1.3% in this age group. Use of LARCs and permanent methods greatly increases as women age. Specifically, membership in the Consistently Covered profile increases to 8% of women in their early twenties and then increases twofold by the time women in Nepal reach their mid to late twenties (22%). This trend continues as Consistently Covered membership rises to 35.6% among 30-34-year-olds, 39.9% among the 35-39 age group, and then peaks at 44% among the 40-44 age group.

The Family Builder profile occurs more frequently among those women age 15-19 and 20-24, with a decreasing prevalence beginning among the 25-29 and older age groups. The Modern Mother profile follows the same pattern, although there is lower prevalence throughout the age ranges, and especially in the youngest age groups.

Among women age 15-19, the Quiet Calendar is the most common profile (accounting for a majority of this age group), followed by the Family Builder profile. In the oldest age groups, however, the most

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common profile is the Consistently Covered profile, followed by the Quiet Calendar. The remaining three profiles represent a minority of women in all age groups.

Membership in the Consistently Modern profile, characterized by use of short-term contraceptive methods, increases with age. However, the increase and relative size of this profile is smaller compared to Consistently Covered women and their use of LAPMs. Membership in the Consistently Traditional profile follows the same pattern as does Consistently Modern, although more women fall into the Consistently Modern profile across all age groups.

4.5   Current Need for Family Planning and Method Mix in Each Contraceptive Profile

Figure 41 shows the levels of need for family planning in each of Nepal's contraceptive profiles, using the DHS algorithm for unmet need (Bradley et al. 2012). This definition of unmet need considers contraceptive users of modern methods and traditional methods, alike, to have a met need for family planning. Figure 41 reveals striking variation in levels of unmet need based on contraceptive profile.

Figure 41   Current need for family planning among women in each Nepal contraceptive profile
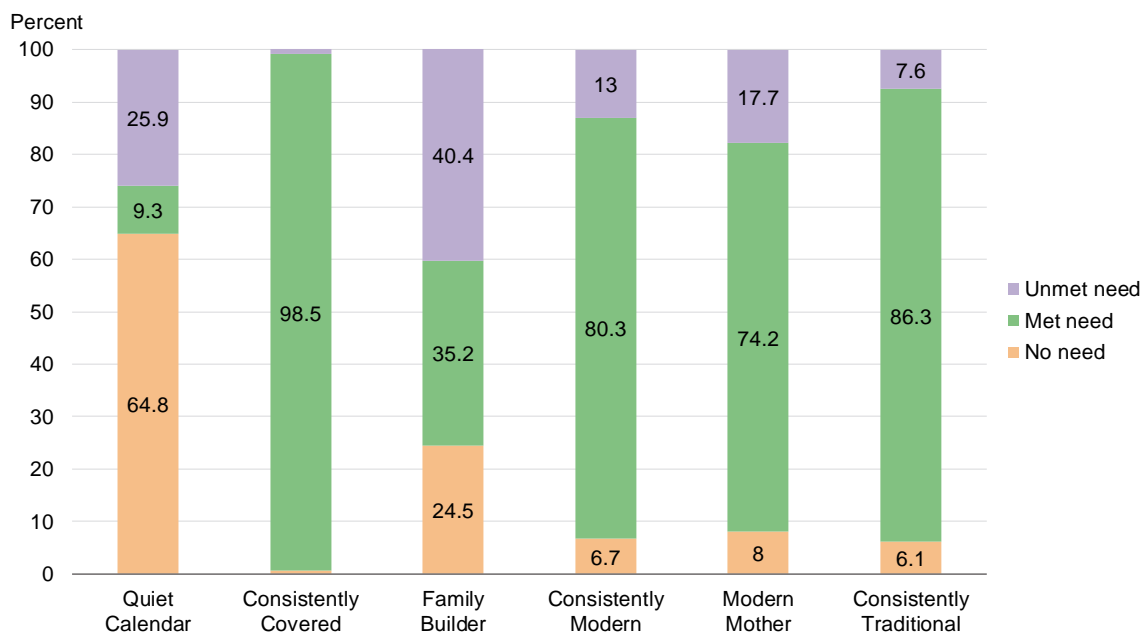
More women in the Quiet Calendar profile are likely to have no need for family planning (65%) compared to any other profile. Still, more than a quarter of women in this profile have an unmet need for family planning. Levels of unmet need are highest, at 40%, in the Family Builder profile. More women in this profile experience unmet need than experience met need (35%) or no need (25%).

Levels of unmet need (and no need) are lowest in the four profiles involving contraceptive use. It is nearly nonexistent among women in the Consistently Covered profile, 99% of whom have met their need for family planning. The Consistently Modern, Modern Mother, and Consistently Traditional profiles are also each characterized by women having met their need for family planning (74%-86% of women). However, they do vary in the proportion with unmet need. Just 8% of Consistently Traditional women have an unmet

need for family planning as compared with 13% of Consistently Modern women and 18% of Modern Mothers.

In Figure 42, we present the method mix among current contraceptive users, or the contribution of each method to overall contraceptive use. This figure essentially describes the contraceptive method of women with met need—the green bar—depicted in Figure 42. As with need status, the method used by contraceptive users varies in each profile.

Figure 42   **Current method mix among contraceptive users in each Nepal contraceptive profile**
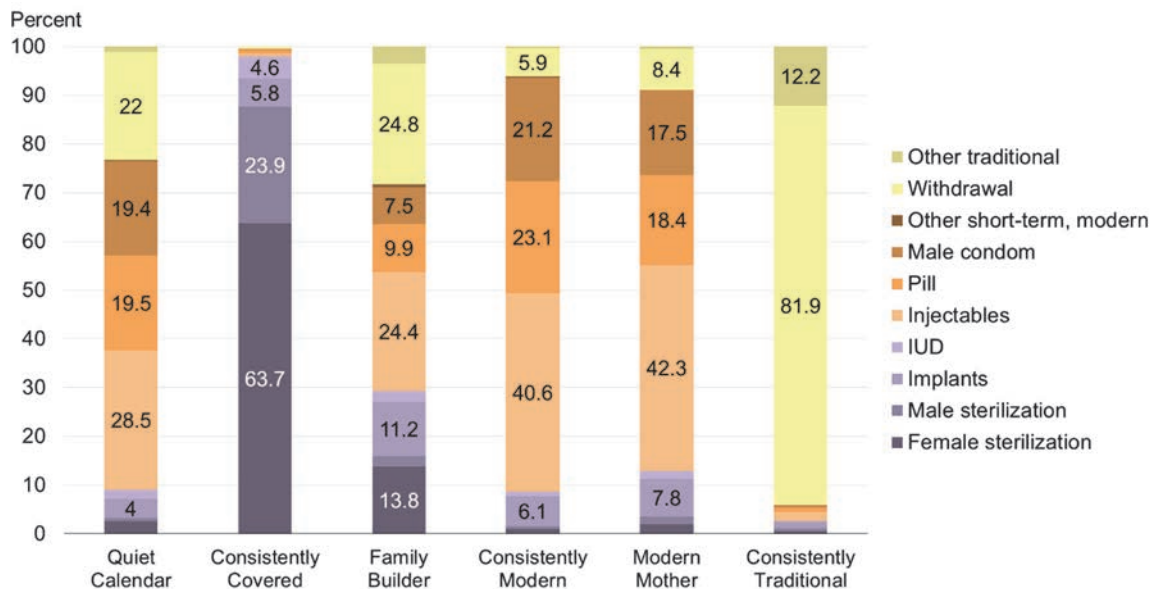
Women in the Consistently Covered and Consistently Traditional profiles stand apart from the other profiles for their lack of short-term, modern method use. Among Consistently Covered women, female sterilization accounts for the majority of all contraceptive use (64%), followed by male sterilization (24%) and LARCs. In no other profile do LAPM methods contribute similarly to overall contraceptive use. In contrast, in the Consistently Traditional profile, LAPM use is as negligible as short-term modern method use. Withdrawal is the dominant method, accounting for 82% of use.

The method mix is similar among contraceptive users in the Consistently Modern and Modern Mother profiles. The most common methods are injectables (41%-42% of use), pills (23%-18%), and the condom (21%-18%). Implant use and withdrawal make up a small portion of overall use in these profiles. Although few women (9%) in the Quiet Calendar profile currently use contraception, those that do commonly use short-term, modern methods. These methods combined constitute 68% of all use in this profile. The most common individual methods are the injectable (29% of contraceptive use), withdrawal (22%), pill (20%), and condoms (19%). The method mix is most eclectic among the 35% of Family Builders who use contraception. Although collectively short-term, modern methods contribute more to overall use than either of the other types of contraception, withdrawal is the most common method. It constitutes 25% of all use and is closely followed by injectables at 24%. Female sterilization and implants are also relatively prevalent, accounting for 14% and 11% of all use, respectively. This is the profile with the second-highest prevalence of LAPM methods and the highest prevalence of implants.

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4.6   Current Characteristics of Women in Each Contraceptive Profile across Age Groups

Figures 43-48 present the current characteristics of women in each of the six profiles identified in Nepal, disaggregated by age.[8] As with Burundi, these are a sampling of all available characteristics that we select as salient features of women at each 10-year age range. See Appendix Tables A9-A14 for details of all characteristics. We typically select indicators relating to entry into relationships for women age 15-24, those related to unmet need for family planning and contraceptive use for women age 25-34, and fertility and fertility preferences for those age 35-44.

An interactive, online dashboard for these data would allow the user to choose from the menu of all available characteristics to draw comparisons within a contraceptive profile across the life course or across Nepal's profiles (overall or by age) along dimensions of interest to the user. Extending these analyses to more surveys would facilitate comparison of Nepali profiles with those of other countries.

The characteristics in these infographics are current measures, captured at the time of the survey. Because these characteristics follow, rather than precede, the sequences by which the women were sorted into profiles, no causation is implied. Furthermore, because we are disaggregating women by age rather than following them throughout their entire reproductive lives, these data should not be interpreted as portraying the exact life path taken by individual women in these profiles.

In a comparison of women age 15-24 in the Quiet Calendar with those in the Family Builder profile, there is a greater proportion of women in the Quiet Calendar who have completed secondary education or higher than Family Builders (75% versus 50%). The same educational pattern is evident among women age 25-34 and 35-44 in these profiles, although the differences are smaller. Substantial proportions of married women of all ages in both profiles have husbands who live elsewhere, although a lower percentage of Quiet Calendar women age 15-24 and 25-34 are married as compared with their age counterparts in the Family Builder profile. While nearly 6 in 10 Family Builders age 25-34 say the ideal number of children is two, about 3 in 10 Family Builders age 35-44 have six or more children. Forty-two percent of Quiet Calendar women age 25-34 have an unmet need for family planning. Levels of unmet need are somewhat higher among Family Builders than Quiet Calendars for women age 35-44. Notably, a higher proportion of Quiet Calendars currently experience no need as compared with Family Builders at all ages.

A preference for two children is a strong norm across all four profiles involving contraceptive use at all ages. A comparison of Modern Mothers with Consistently Modern women age 25-34 shows that Modern Mothers are less likely (31%) to have two children than Consistently Modern women (45%). Women age 15-24 who are Consistently Modern and Consistently Traditional show similar levels of met and unmet need for family planning, although they differ in their fertility preferences. A higher percentage of Consistently Modern women age 15-24 want no more children (69%) compared with Consistently Traditional women this age (59%), while Consistently Traditional women are more likely to want another child after 2 or more years (24% compared to 13%). The high proportion of women of all ages in these profiles who want no more children combined with their long-term use of short-term, modern and traditional methods, respectively, suggests that many women in these profiles use these methods for limiting purposes. Consistently Covered women of all ages, in contrast with these other contraceptive profiles, are

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[8] Age is expressed as women's age at the start of their calendar sequence.

notable for the high levels who want no more children and nearly universal levels of met need. The most common contraceptive method in this profile is female sterilization.

Figure 43   Current characteristics of women in the Quiet Calendar profile, by age at start of the calendar sequence
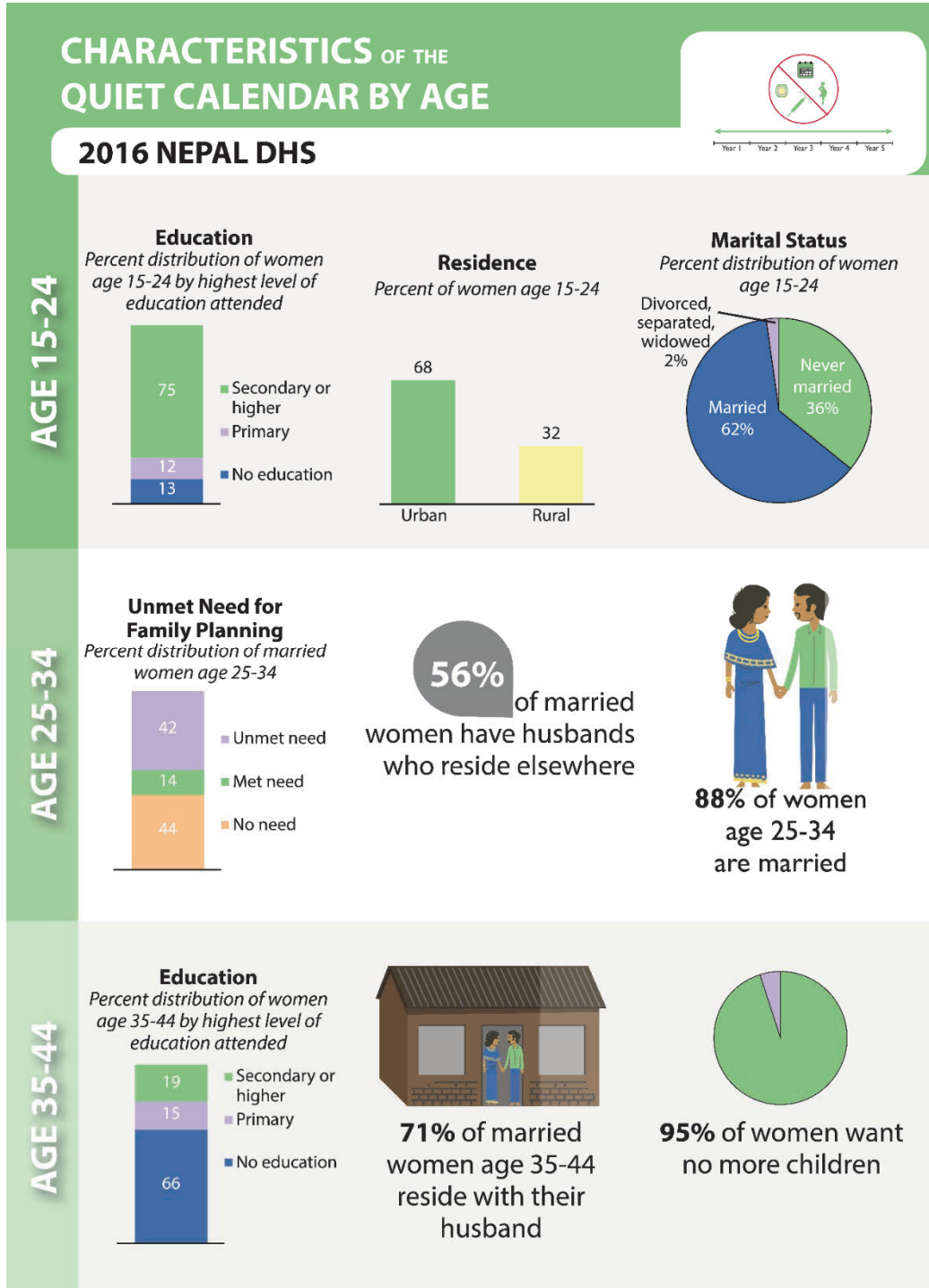
Figure 44 **Current characteristics of women in the Consistently Covered profile, by age at start of the calendar sequence**

CHARACTERISTICS OF THE
CONSISTENTLY COVERED BY AGE

2016 NEPAL DHS

AGE 15-24

Education
Percent distribution of women age 15-24 by highest level of education attended

30 — Secondary or higher
25 — Primary
45 — No education

64% of women say the ideal number of children is **2**

Unmet Need for Family Planning
Percent distribution of married women age 15-24

4 — Unmet need
95 — Met need
1 — No need

AGE 25-34

99% of women age 25-34 are married

74% of married women reside with their husband

64% of women have **2 to 3** children

AGE 35-44

Education
Percent distribution of women age 35-44 by highest level of education attended

15 — Secondary or higher
13 — Primary
72 — No education

Residence
Percent of women age 35-44

64 Urban
36 Rural

ALL women age 35-44 want no more children

Figure 45   Current characteristics of women in the Family Builder Profile, by age at start of the calendar sequence

CHARACTERISTICS OF THE FAMILY BUILDER BY AGE

2016 NEPAL DHS

AGE 15-24

Education
Percent distribution of women age 15-24 by highest level of education attended

50 ■ Secondary or higher
20 ■ Primary
30 ■ No education

Residence
Percent of women age 15-24

55 Urban
45 Rural

51% of married women age 15-24 reside with their husband

AGE 25-34

99% of women age 25-34 are married

57% of women say the ideal number of children is **2**

Household Wealth
Percent distribution of women age 25-34 by wealth quintiles

27 Lowest
19 Second
20 Middle
17 Fourth
17 Highest

AGE 35-44

29% of women age 35-44 have 6+ children

97% of women want no more children

Unmet Need for Family Planning
Percent distribution of married women age 35-44

46 ■ Unmet need
38 ■ Met need
16 ■ No need

Figure 46   Current characteristics of women in the Consistently Modern profile, by age at start of the calendar sequence
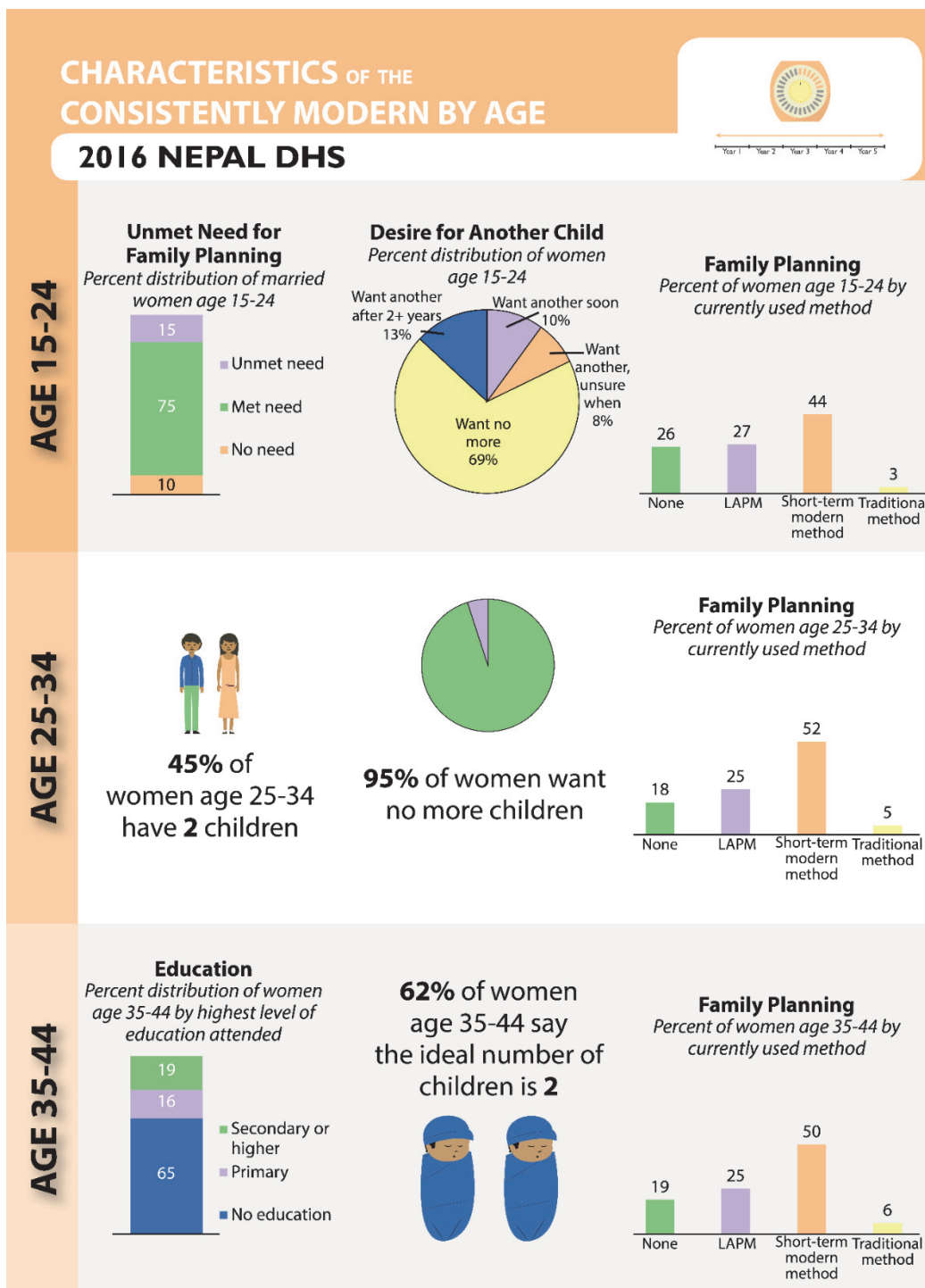
Figure 47 Current characteristics of women in the Modern Mother Profile, by age at start of the calendar sequence
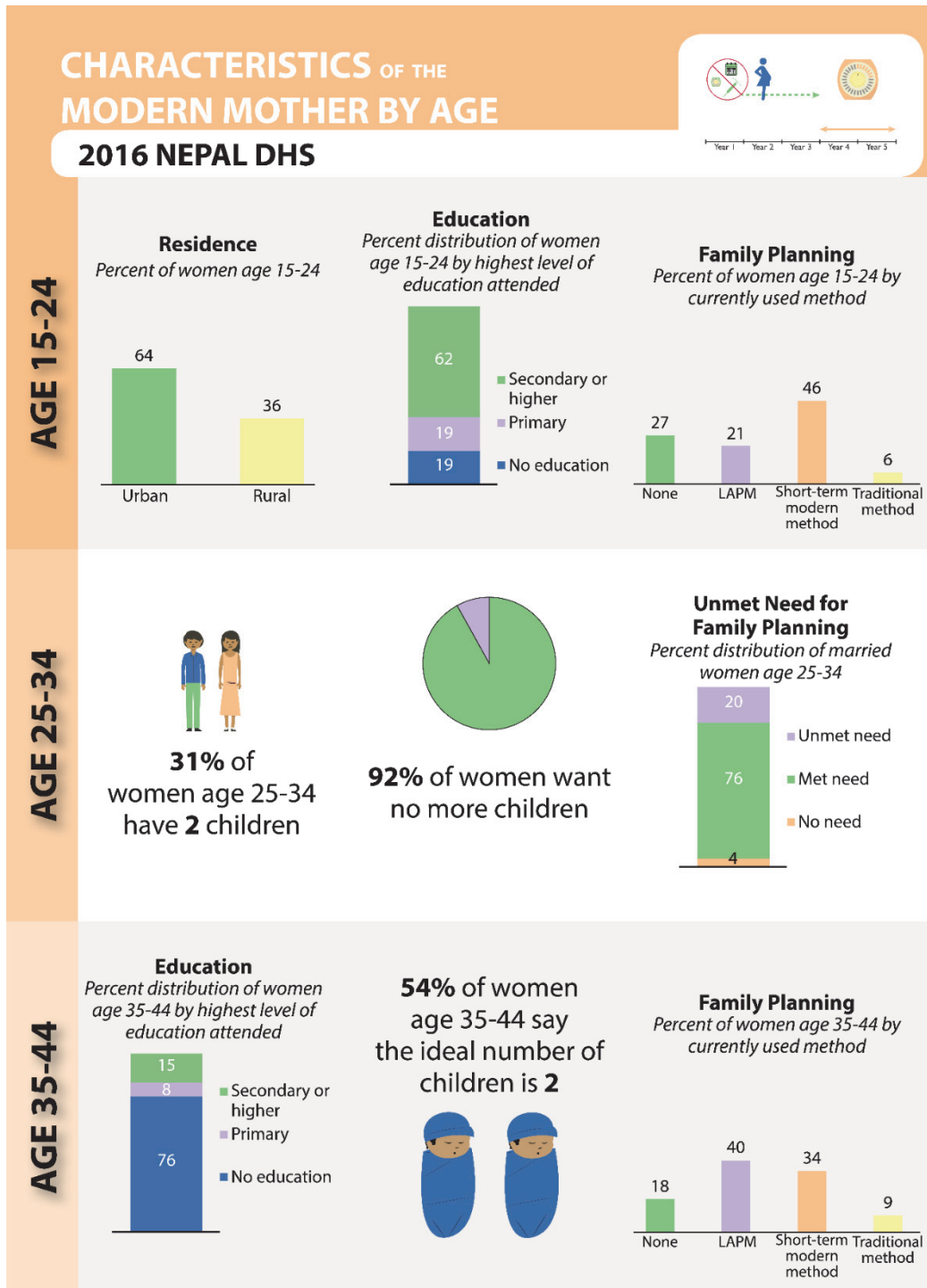
Figure 48   **Current characteristics of women in the Consistently Traditional Profile, by age at start of the calendar sequence**
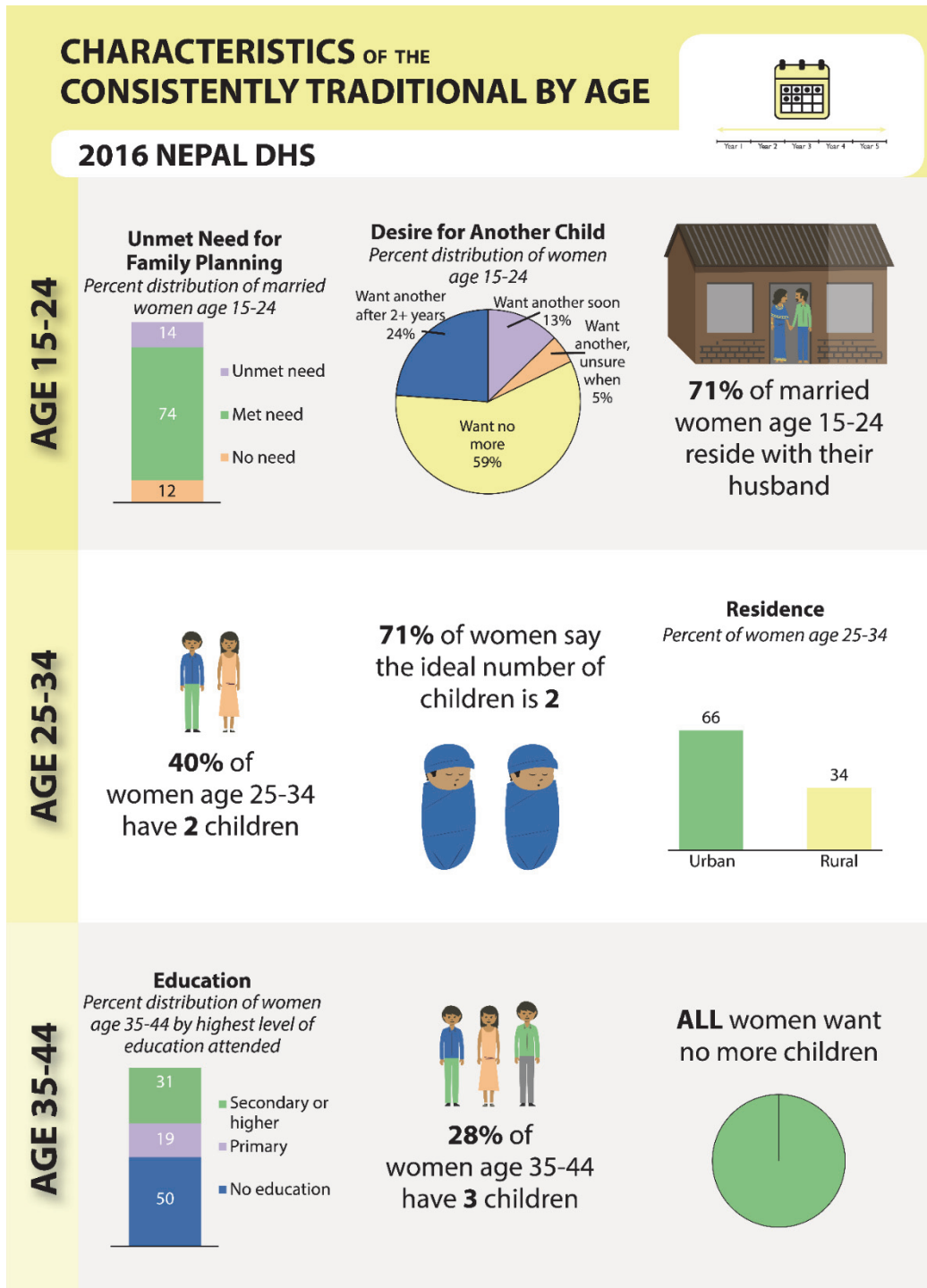
5   DISCUSSION AND CONCLUSION

Our study looked at patterns in women's contraceptive and pregnancy experience by using dynamic experiences captured in retrospective, longitudinal data and not the typical cross-sectional measures. We put to new use DHS contraceptive calendar data in two countries with differing contexts: Burundi and Nepal. We applied sequence and cluster analysis for longitudinal data to identify discrete profiles that characterize women's contraceptive and pregnancy behaviors over the previous 5 years. This is believed to be the first such application of these methods to longitudinal contraceptive data. We also sought to develop new ways to visualize the profiles of women's contraceptive behavior and to describe how these profiles change over the life course.

Despite the differing contexts, we found several commonalities between the contraceptive profiles of both countries. We found more nuanced variation in the expression of profiles that describe contraceptive use in Burundi compared with Nepal than in the expression of profiles describing non-use—Quiet Calendar and Family Builder profiles are very similar. We also found similarities in the age structure of these profiles, with the exception of profiles in which LAPM use figures prominently. The age distribution of profiles with LAPM use in Nepal contrast both with profiles of other contraceptive use in that country and with profiles with LAPM use in Burundi. The data visualizations that describe women's 5-year contraceptive and pregnancy experiences and the characteristics of women in these profiles over the life course can assist reproductive health providers to better understand their clients and potential clients.

5.1   Summary

There are several similarities in the two study countries. The first is that both cluster analyses reveal six contraceptive profiles in each country. In Burundi, three of these profiles describe patterns of contraceptive non-use and three describe patterns of contraceptive use. In Nepal, two describe non-use, while four describe patterns of use.

Several of the profiles found in each country are the same. Burundi and Nepal share a Quiet Calendar, Family Builder (two in Burundi), and Modern Mother profile. In both countries, the Quiet Calendar is the most prevalent profile, with 42% and 36% of women, respectively. Although the Modern Mother is the third most common profile in Burundi and the second most common profile in Nepal, these profiles occur with similar frequency of 8% and 7%, respectively. In both countries, a substantial portion of women in Quiet Calendar profile have never had sex (age 15-24), have no need for family planning (age 25-34), or have reached or exceeded their desired family size (age 35-44).

One difference is that Family Builders show two separate profiles in Burundi compared with just one in Nepal. The differences among these three profiles come down to a matter of timing of the pregnancies (usually two per 5-year sequence) experienced over the course of the sequence. Family Builders are far more prevalent in Burundi than Nepal, accounting for 43% of women combined versus 15% in Nepal. This likely reflects the higher fertility in Burundi. The Family Builder I and Family Builder II profiles in Burundi are quite similar to each other in terms of the attributes of the calendar sequences (except for minor differences in the timing of pregnancies), the age distribution, and the characteristics of their members. This

suggests that while there are statistical differences, there are few programmatically meaningful differences between these profiles.

In general, the profiles with substantial contraceptive use, whether traditional, short-term modern, or LAPM, have more experiences of pregnancy in Burundi than in Nepal. Burundi has no profile in which the medoid sequence displays a single state of contraceptive use as shown in the Consistently Covered, Consistently Modern, or Consistently Traditional profiles in Nepal. This reflects the higher fertility context in Burundi and the lower, more compressed fertility context in Nepal.

The Consistently Covered profile is more common in Nepal (21%) than the Consistently Covered Mother profile in Burundi (6%). The countries also differ not only by the experience of a pregnancy, but by the longer stretch of time during which LAPM methods are used in Nepal compared with Burundi. This may reflect the reliance on female sterilization in the method mix in Nepal and the prevalence of IUD and implant use in Burundi (Bertrand et al. 2014; Moore et al. 2015; Tamang, Subedi, and Packer 2010).

The Modern Mother profile is very similar in both study countries. Nonetheless, women in this profile in Nepal wait longer—in relation to both the beginning of their calendar sequence and the end of their most recent pregnancy—before adopting a short-term, modern method, and they spend less time (24 months versus 36 months) using these methods than do Burundi women in this profile. It is unclear how differences in the availability of short-term, modern methods, method preference, or norms about postpartum contraceptive use may account for these differences.

Furthermore, there are women who use short-term modern methods over a long period of time in Nepal (the Consistently Modern profile). This profile is absent from Burundi. This may reflect the relative absence of a wide range of available and acceptable options (other than female sterilization) in Nepal for avoiding pregnancy over a relatively long period of time. In Burundi, this need is filled by use of LARC methods (namely IUDs and implants), which are infrequently used in Nepal (Benova et al. 2017; Chakraborty et al. 2015; Jacobstein and Polis 2014; Tamang, Subedi, and Packer 2010).

A fourth contrast is the Consistently Traditional profile (6%) in Nepal and the Traditional Mother (2%) profile in Burundi, which are the only profiles characterized by traditional method use. They differ not only in their prevalence but also in their duration of use. Women in Nepal appear to use traditional methods for long stretches, possibly for limiting and not only for spacing births, as evidenced by the increasing prevalence of this profile with age. In Burundi, women use traditional methods interspersed with pregnancies. The prevalence of this profile is most common in the middle of the age distribution, which suggests that women are using traditional methods as a spacing method.

The Quiet Calendar profile shows the same age pattern in both Burundi and Nepal. Prevalence of this profile is relatively high in the younger age groups, lowest in the middle age groups, and somewhat higher again in the oldest age groups. The increase in prevalence at the older age groups is more pronounced in Burundi than in Nepal. Across all ages, Quiet Calendar women in Nepal are more likely to have a husband who lives separately. Other research has documented the magnitude of male labor migration and the effect of this spousal separation on overestimating unmet need and reducing fertility (Khanal et al. 2013; Prakash, Pandey, and Bietsch 2019).

The Family Builder profile appears earlier in the life course in Nepal than do Family Builder I or II profiles in Burundi. Other than this minor difference, they follow the same pattern of declining with age group after the mid to late 20s.

Two of the contraceptive use profiles in each country—Traditional Mother and Modern Mother in Burundi and Consistently Traditional and Consistently Modern profiles in Nepal—show the same age distribution in each country, with higher prevalence in the middle age groups than either the youngest or oldest age groups. The Consistently Covered Mother profile in Burundi follows this same age pattern, but the corresponding profile in Nepal—Consistently Covered—shows an entirely different age pattern that steadily increases with age. This reflects the greater concentration of permanent methods than LARC methods, which are used for limiting compared to Burundi, where LARC methods are used for spacing.

5.2   Strengths, Limitations, and Future Directions

This study applied innovative statistical methods of sequence and cluster analysis designed for use with longitudinal data. These methods, combined with DHS calendar data, provide an innovative window on the dynamic nature of women's contraceptive and pregnancy experiences that cannot be gained by examining current or cross-sectional measures alone.

This study adds to several other efforts that visualize DHS calendar data in new, user-friendly ways. Among these are researchers at the Duke University Center for Global Reproductive Health who have adapted chord plots to interactively depict movement between two or more contraceptive methods at two points in time (Finnegan 2019). Meanwhile, a group at the Population Reference Bureau through the Policy, Advocacy, and Communication Enhanced for Population and Reproductive Health (PACE) Project is preparing to unveil an online tool that displays discontinuation rates (https://www.prb.org/program/pace-moving-family-planning-and-reproductive-health-forward/).

This study used data visualizations native to the R programs of TraMineR and WeightedClusters to display attributes of the contraceptive profiles themselves. We also developed a graphic representation of the profiles and infographic displays of women's characteristics in each profile at each age group. These visualizations provide a fuller picture of the contraceptive and family-building experience across the life course. In contrast with the other efforts, which have a web-based, interactive dashboard, our visualizations currently are static. There is future potential, however, to develop an R Shiny application or Tableau dashboard that would allow users to interact with these data. Currently, The DHS Program has an existing application for interacting with survey data: STATcompiler. Within STATcompiler, users can visualize indicators in the database in tables, column charts, and line graphs to explore background characteristics and assess trends over time. An interactive R Shiny or Tableau dashboard would facilitate more flexibility to understand the types of women that constitute each profile, to see changes across age, to compare across profiles within a country, or make cross-country comparisons among similar profiles.

This study analyzed DHS data from two countries. The analysis revealed some similarities, notably in the patterns of contraceptive non-use found in the Family Building and Quiet Calendar profiles, and more variation among the contraceptive use profiles identified in these countries. Although two countries are an insufficient basis to make broader generalizations, this limited foray suggests that beyond certain fundamental patterns of family building, contraceptive profiles will vary just as fertility regimes do.

The contraceptive profiles identified in Burundi and Nepal differ somewhat from the seven profiles identified using slightly different techniques for longitudinal calendar data in the 1996 Brazil DHS (Dias and Willekens 2005). This study found profiles similar to a Quiet Calendar and a Family Builder profile to be the two most common among women age 20-34. Although the study also identified a mixture of intermittent and intensive contraceptive patterns (similar to the Consistent profiles), the profiles did not sort by type of contraceptive method (short-term, modern; traditional; LAPM) as women in Burundi and Nepal did, and a discontinuer profile was identified in Brazil, which did not emerge in either of our study countries. A study examining women's contraceptive use and relationship status over a shorter period in Malawi identified clusters that loosely align with the Family Builder (which the authors terms "Pursuing Conception"), Modern Mother ("Childbearing Consistent Users"), and Consistently Covered Mother ("Married Spacing") (Furnas 2016).

A study in Niger that used static (current, cross-sectional) measures of multiple attitudinal and behavioral dimensions identified both distinct subgroups of women based on their use of modern versus traditional methods (Dalglish et al. 2018), as we found in Nepal and Burundi, and a subgroup of women whose method mix was blended, as found in the Brazil study (Dias and Willekens 2005).

These studies provide further evidence of cross-country variation in contraceptive profiles over time. Expanding this analysis to a greater number of countries would allow us to draw conclusions about the extent to which identifiable contraceptive profiles are common across cultural and fertility settings and precisely how these profiles co-vary with various features of these settings.

5.3   Conclusion

This study applied sequence and cluster analysis with retrospective, longitudinal data in DHS contraceptive calendars to identify discrete profiles that characterize women's contraceptive and pregnancy experiences over the previous 5 years. We also developed new data visualizations to display women's contraceptive profiles and how they shift over the life course. Despite the differing contexts in Burundi and Nepal, we found several commonalities in the identified contraceptive profiles. Quiet Calendar and Family Builder profiles were present in both countries and exhibited the same age distribution. There were a greater number of subtle differences in the profiles involving contraceptive use. Sequences in these profiles more commonly included pregnancies in Burundi than in Nepal. The largest difference was found between the Consistently Covered Mother and Consistently Covered profiles, which increased with age in Nepal but were concentrated in the middle reproductive ages in Burundi. These differences between their profiles likely reflect dissimilarities in the fertility regimes and method mix of the two countries. The data visualizations of women's dynamic contraceptive profiles, their age pattern, and characteristics of their members over the life course provide a roadmap both for expanding the analysis to additional countries and for conveying the results to program managers.

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APPENDIX

Appendix Table A1   Burundi sample description, by age at start of the calendar sequence.
Percent distribution and means.

	15-19		20-24		25-29		30-34		35-39		40-44	
	(n=3,219)		(n=3,006)		(n=2,431)		(n=1,941)		(n=1,533)		(n=1,165)	
	%	N	%	N	%	N	%	N	%	N	%	N
Type of place of residence												
Urban	14.9	479	13.1	393	12.9	315	12.2	237	10.4	160	7.1	83
Rural	85.1	2,740	86.9	2,613	87.1	2,116	87.8	1,703	89.6	1,373	92.9	1,082
Highest education level												
No education	23.4	755	44.2	1,328	46.1	1,120	43.9	852	65.0	997	77.6	904
Primary	38.3	1,234	37.7	1,133	41.6	1,011	45.0	874	28.4	435	18.0	209
Secondary+	38.2	1,230	18.1	545	12.3	300	11.1	215	6.6	100	4.4	52
Household wealth quintile												
Poorest	17.6	566	20.2	607	21.0	510	22.1	429	22.6	347	20.5	238
Poorer	19.3	622	20.8	626	19.3	468	19.0	370	21.6	331	23.3	272
Middle	21.3	686	20.5	615	19.9	484	18.2	353	18.7	287	21.2	247
Richer	19.3	622	17.7	532	18.8	458	18.3	355	19.4	297	21.4	249
Richest	22.5	723	20.8	626	21.0	512	22.4	434	17.7	272	13.6	159
Ever had sex												
No	34.9	1,125	11.6	350	3.3	81	3.0	59	1.5	24	1.6	18
Yes	65.1	2,094	88.4	2,656	96.7	2,350	97.0	1,882	98.5	1,509	98.4	1,147
Mean age at 1st sex (among those who have ever had sex)												
Mean	17.9	2,094	18.9	2,656	19.4	2,350	19.8	1,882	19.8	1,509	19.8	1,147
Marital status												
Never in union	46.2	1,487	16.9	508	5.2	126	4.7	90	2.9	44	3.3	38
Currently in union/living with a man	47.8	1,537	76.0	2,283	84.9	2,064	82.8	1,608	77.2	1,183	71.9	837
Formerly in union/living with a man	6.0	195	7.1	214	9.9	241	12.5	243	19.9	306	24.9	290
Husband/partner's residential status												
Living with her	87.0	1,337	86.4	1,973	86.5	1,785	87.7	1,411	90.5	1,070	92.5	774
Staying elsewhere	13.0	200	13.6	310	13.5	279	12.3	197	9.5	113	7.5	63
Marital duration												
Never married	46.2	1,487	16.9	508	5.2	126	4.7	90	2.9	44	3.3	38
0-4	34.0	1,093	15.0	451	6.5	159	1.5	29	0.5	8	0.1	1
5-9	19.2	617	46.0	1,382	17.7	431	6.9	134	2.3	36	0.9	10
10-14	0.7	23	20.8	627	45.5	1,105	20.2	393	4.5	69	1.4	16
15-19	0.0	-	1.3	38	23.8	578	45.8	890	20.8	319	5.8	68
20-24	0.0	-	0.0	-	1.3	32	19.8	385	49.1	752	23.5	274
25-29	0.0	-	0.0	-	0.0	-	1.0	19	19.3	296	46.6	543
30+	0.0	-	0.0	-	0.0	-	0.0	-	0.6	10	18.4	215

Continued…

	15-19		20-24		25-29		30-34		35-39		40-44	
	(n=3,219)		(n=3,006)		(n=2,431)		(n=1,941)		(n=1,533)		(n=1,165)	
	%	N	%	N	%	N	%	N	%	N	%	N
Children ever born												
0	43.8	1,410	16.6	498	5.3	129	5.0	97	3.0	46	2.9	34
1	28.6	920	11.6	350	4.9	120	2.7	52	2.6	40	2.4	28
2	19.5	627	23.7	713	9.5	231	4.7	91	4.5	69	4.1	48
3	6.7	216	26.0	781	18.8	456	8.9	173	5.9	90	4.8	56
4	1.1	35	14.5	437	21.0	510	14.7	286	9.1	139	6.6	77
5	0.4	12	5.5	164	20.1	489	19.3	375	14.2	217	11.1	129
6+	0.0	-	2.1	62	20.4	496	44.6	866	60.7	931	68.2	794
Fertility desires												
Wants within 2 years	11.3	364	13.9	418	11.9	290	13.1	254	9.9	151	4.6	53
Wants after 2+ years	48.8	1,569	48.7	1,465	31.6	769	13.1	253	3.4	52	0.6	7
Wants, unsure timing	32.0	1,030	13.7	412	5.9	144	4.6	89	2.8	43	1.4	16
Wants no more/sterilized/ infecund	8.0	256	23.6	711	50.5	1,228	69.3	1,345	84.0	1,287	93.4	1,088
Ideal number of children												
0	1.2	38	1.1	34	1.1	28	2.1	40	1.9	30	2.2	25
1	0.8	25	1.1	33	1.1	28	1.0	20	1.3	20	1.1	13
2	7.2	231	6.8	204	7.3	177	6.7	130	8.3	128	8.8	103
3	41.6	1,340	32.5	978	29.8	723	31.6	612	29.5	453	31.3	365
4-5	41.4	1,333	48.8	1,467	45.9	1,115	42.2	820	43.0	659	38.9	453
6+	5.7	184	7.7	233	12.3	300	14.8	287	14.0	214	15.2	177
Non-numeric response	2.1	68	1.9	57	2.5	61	1.6	31	1.9	30	2.5	29
Type of contraception currently used												
Not using	82.2	2,646	75.3	2,262	73.1	1,776	73.4	1,425	78.8	1,207	87.2	1,016
LARC/permanent method	4.8	153	8.3	250	8.8	213	10.4	201	7.2	110	5.4	63
Short-term modern method	10.6	342	12.2	366	12.3	299	9.9	192	8.6	132	3.6	42
Traditional method	2.4	77	4.2	128	5.8	142	6.3	122	5.5	84	3.8	45
	(n=1,537)		(n=2283)		(n=2,064)		(n=1,608)		(n=1,183)		(n=837)	
Unmet need among currently married women												
No need	45.1	693	42.3	967	36.8	759	34.1	548	38.3	453	59.9	501
Unmet need	23.9	367	27.5	628	33.1	684	35.5	571	35.4	419	23.1	193
Met need	31.0	477	30.2	689	30.1	621	30.4	488	26.3	311	17.0	143

Appendix Figure A1   Density plots of Burundi contraceptive profiles
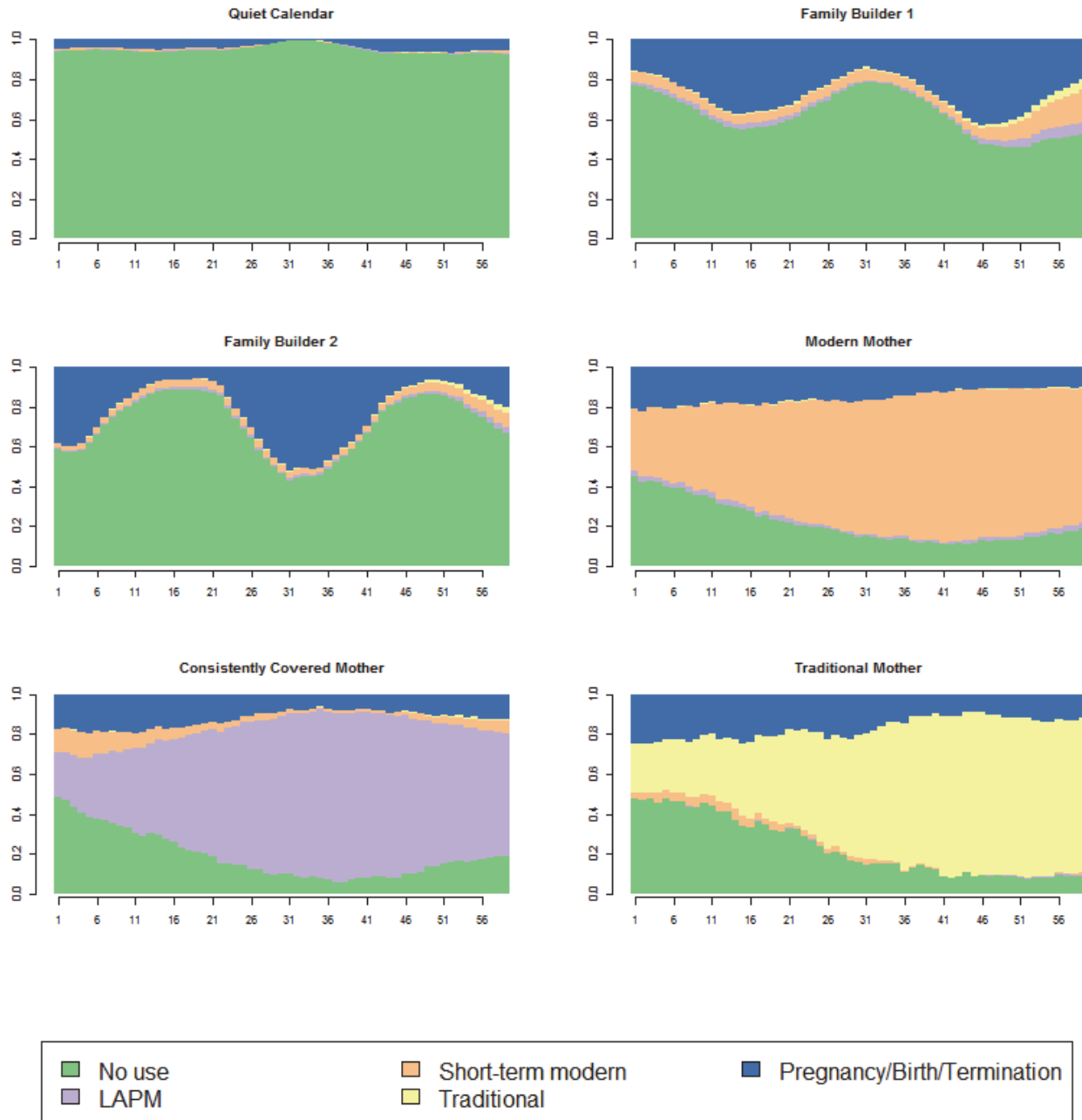
Appendix Table A2   **Nepal sample description, by age at start of the calendar sequence. Percent distribution and means.**

| | 15-19 | | 20-24 | | 25-29 | | 30-34 | | 35-39 | | 40-44 | |
| | (n=2,274) | | (n=2,092) | | (n=1,814) | | (n=1,556) | | (n=1,378) | | (n=1,074) | |
	%	N	%	N	%	N	%	N	%	N	%	N
Type of place of residence												
Urban	62.1	1,412	63.7	1,333	63.9	1,159	61.9	963	63.4	873	64.1	689
Rural	37.9	862	36.3	759	36.1	655	38.1	594	36.6	505	35.9	385
Highest education level												
No education	15.1	344	28.1	589	37.7	684	54.1	842	63.1	869	73.3	787
Primary	15.6	354	18.4	384	22.1	401	19.2	299	15.2	209	13.4	144
Secondary+	69.3	1,575	53.5	1,119	40.1	728	26.6	415	21.8	300	13.3	143
Household wealth quintile												
Poorest	15.2	346	15.1	316	16.1	293	18.2	283	17.6	243	16.5	177
Poorer	21.0	478	17.7	371	19.1	346	20.3	316	18.0	248	21.6	232
Middle	21.4	486	20.3	425	18.8	340	18.3	286	20.3	280	20.7	222
Richer	22.5	513	22.8	477	21.1	382	19.9	309	20.8	286	18.1	195
Richest	19.8	451	24.0	502	25.0	453	23.3	363	23.4	322	23.0	247
Ever had sex												
No	23.6	536	6.5	136	2.1	38	0.8	12	1.1	15	1.4	15
Yes	76.4	1,738	93.5	1,956	97.9	1,775	99.2	1,544	98.9	1,363	98.6	1,059
Mean age at 1st sex (among those who have ever had sex)												
Mean	17.6	1,738	18.2	1,956	18.0	1,775	17.7	1,544	17.8	1,363	17.8	1,059
Marital status												
Never in union	23.7	540	6.4	134	2.3	41	0.8	12	1.3	19	1.4	15
Currently in union/living with a man	75.5	1,716	92.1	1,927	95.6	1,734	96.1	1,495	92.4	1,274	90.6	973
Formerly in union/living with a man	0.8	18	1.5	31	2.1	38	3.2	50	6.2	86	8.1	87
Husband/partner's residential status												
Living with her	55.2	947	57.6	1,110	62.0	1,076	72.3	1,081	80.3	1,023	85.9	836
Staying elsewhere	44.8	770	42.4	817	38.0	659	27.7	414	19.7	251	14.1	137
Marital duration												
Never married	23.7	540	6.4	134	2.3	41	0.8	12	1.3	19	1.4	15
0-4	42.7	971	14.5	302	2.2	40	0.6	9	0.2	2	0.0	1
5-9	31.7	721	39.2	820	10.7	194	1.3	20	0.6	8	0.5	5
10-14	1.8	42	36.9	773	38.2	693	8.5	133	2.3	32	0.2	2
15-19	0.0	-	3.0	63	43.4	788	40.3	627	8.2	113	1.5	16
20-24	0.0	-	0.0	-	3.1	57	45.3	706	42.1	580	9.3	100
25-29	0.0	-	0.0	-	0.0	-	3.2	50	40.8	562	42.3	454
30+	0.0	-	0.0	-	0.0	-	0.0	-	4.6	64	44.8	481
Children ever born												
0	39.5	897	13.1	274	4.6	84	2.9	45	3.1	43	2.7	29
1	35.0	797	25.4	530	13.1	237	6.1	95	5.1	70	3.3	36
2	18.9	430	34.1	714	37.0	672	29.1	452	23.4	323	13.6	146
3	5.6	126	18.0	376	23.2	421	25.4	396	23.7	327	25.2	271
4	0.9	20	7.0	146	12.7	230	18.1	282	17.8	246	19.5	209
5	0.2	4	1.9	39	5.5	99	10.5	163	12.8	177	14.2	153
6+	0.0	-	0.7	14	3.9	71	7.9	123	14.0	193	21.5	231

Continued…

	15-19		20-24		25-29		30-34		35-39		40-44	
	(n=2,274)		(n=2,092)		(n=1,814)		(n=1,556)		(n=1,378)		(n=1,074)	
	%	N	%	N	%	N	%	N	%	N	%	N
Fertility desires												
Wants within 2 years	15.4	350	12.3	258	7.9	144	3.9	61	1.4	19	0.6	6
Wants after 2+ years	30.0	683	13.9	291	3.3	60	0.6	9	0.2	3	0.0	-
Wants, unsure timing	24.2	551	10.4	218	3.9	71	1.3	20	0.5	6	0.7	7
Wants no more/sterilized/ infecund	30.4	690	63.4	1,325	84.9	1,540	94.2	1,467	97.9	1,350	98.8	1,061
Ideal number of children												
0	0.9	21	1.7	36	1.5	27	0.9	14	1.9	26	1.5	16
1	19.1	434	13.8	290	10.2	186	7.0	108	8.0	110	3.7	40
2	68.7	1,562	67.1	1,403	64.2	1,165	61.2	952	55.8	769	54.3	584
3	9.7	222	14.0	293	18.4	334	24.0	373	24.1	332	26.8	288
4-5	1.3	28	2.8	60	5.1	92	6.4	99	9.4	129	12.1	130
6+	0.1	1	0.1	3	0.1	2	0.3	5	0.3	4	0.9	10
Non-numeric response	0.2	6	0.4	8	0.5	9	0.3	5	0.5	7	0.7	8
Type of contraception currently used												
Not using	75.4	1,714	57.0	1,193	43.6	791	33.7	525	34.7	478	39.6	425
LARC/permanent method	7.3	167	19.9	417	30.6	556	42.8	666	45.4	626	46.3	497
Short-term modern method	11.4	259	14.8	310	15.1	273	13.1	204	9.5	130	5.5	59
Traditional method	5.9	135	8.2	172	10.7	194	10.5	163	10.5	144	8.6	92
	(n=1,716)		(n=1,927)		(n=1,734)		(n=1,495)		(n=1,274)		(n=973)	
Unmet need among currently married women												
No need	34.9	599	23.8	459	16.5	286	14.8	222	17.0	217	24.5	238
Unmet need	32.6	560	29.7	572	24.8	430	16.7	250	13.5	171	10.4	101
Met need	32.5	558	46.5	896	58.7	1,019	68.5	1,024	69.5	885	65.1	634

Appendix Figure A2   Density plots of Nepal contraceptive profiles

No use
LAPM
Short-term modern
Traditional
Pregnancy/Birth/Termination
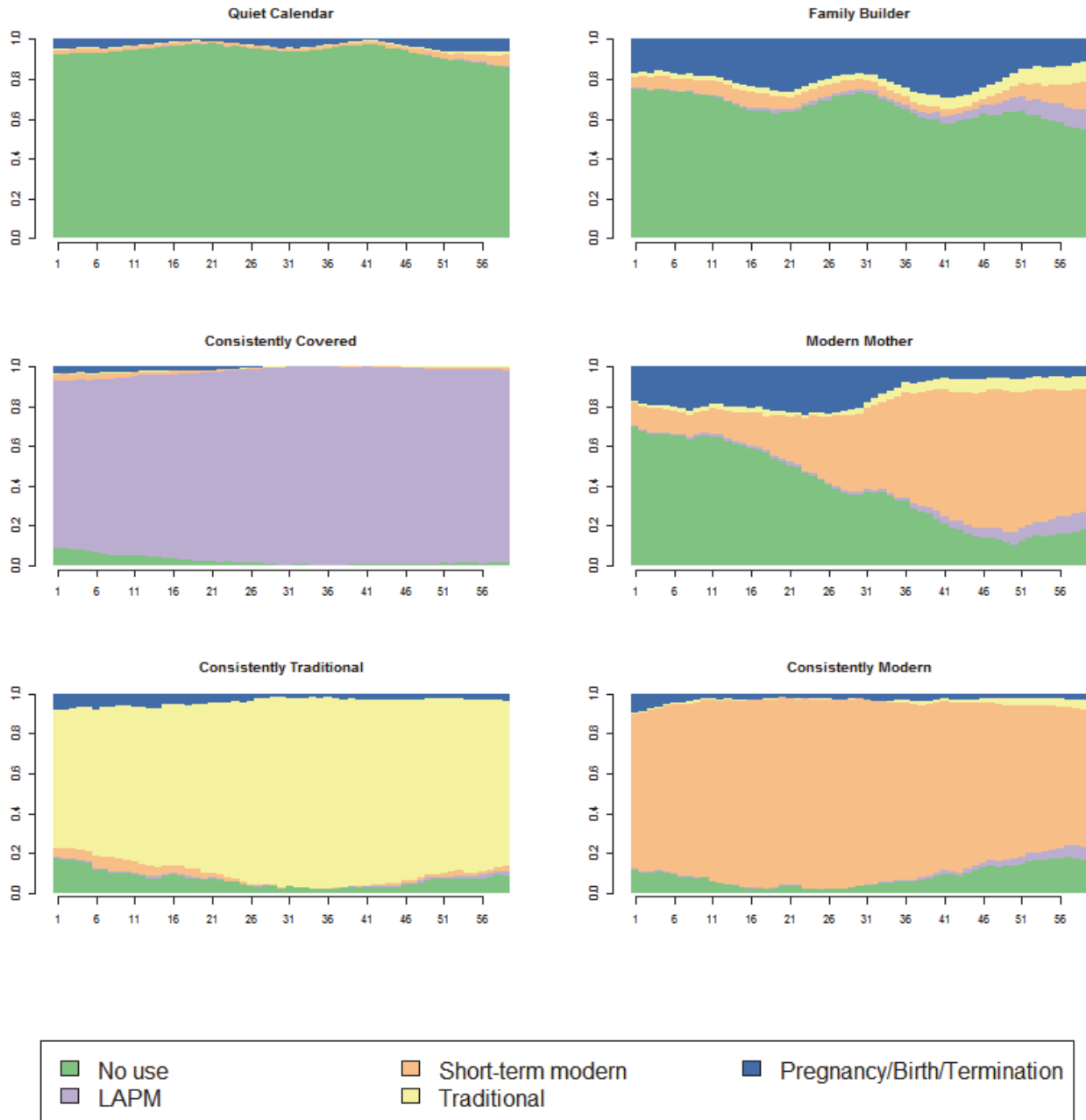
Appendix Table A3   **Current characteristics of women in the Burundi Quiet Calendar profile, by age**

	15-24 (n=2,696)		25-34 (n=1,134)		35-44 (n=1,690)		Total (n=5,521)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	20.4	550	15.3	173	8.9	150	15.8	873
Rural	79.6	2,146	84.7	961	91.1	1,540	84.2	4,647
Highest education level								
No education	19.6	527	46.2	524	74.0	1,250	41.7	2,301
Primary	29.1	785	39.8	452	20.9	353	28.8	1,589
Secondary+	51.3	1,384	14.0	159	5.2	88	29.5	1,631
Household wealth quintile								
Poorest	13.1	352	23.4	266	23.9	404	18.5	1,021
Poorer	16.3	440	19.8	224	21.7	367	18.7	1,031
Middle	20.3	547	18.2	206	19.4	328	19.6	1,082
Richer	19.8	535	15.5	176	19.5	329	18.8	1,040
Richest	30.5	822	23.1	262	15.5	262	24.4	1,346
Ever had sex								
No	54.6	1,472	12.3	139	2.4	41	29.9	1,652
Yes	45.4	1,225	87.7	995	97.6	1,649	70.1	3,869
Mean age at 1st sex (among those who have ever had sex)								
Mean	19.1	1,225	19.9	995	19.7	1,649	19.6	3,869
Marital status								
Never in union	69.1	1,862	17.4	197	4.6	77	38.7	2,136
Currently in union/living with a man	24.7	665	55.4	628	64.3	1,086	43.1	2,379
Formerly in union/living with a man	6.3	170	27.2	309	31.2	527	18.2	1,005
Husband/partner's residential status								
Living with her	82.9	551	78.2	491	90.2	980	85.0	2,022
Staying elsewhere	17.1	114	21.8	137	9.8	107	15.0	358
Marital duration								
Never married	69.1	1,862	17.4	197	4.6	77	38.7	2,136
0-4	19.6	528	6.1	70	0.2	3	10.9	601
5-9	7.4	201	7.8	89	1.5	25	5.7	314
10-14	3.6	97	26.5	301	2.4	40	7.9	438
15-19	0.3	8	29.8	338	11.4	193	9.8	539
20-24	0.0	-	11.4	130	33.6	569	12.7	699
25-29	0.0	-	0.9	10	34.8	589	10.8	599
30+	0.0	-	0.0	-	11.5	194	3.5	194
Children ever born								
0	70.3	1,895	19.8	224	4.6	78	39.8	2,197
1	21.2	571	10.8	123	3.7	62	13.7	756
2	5.0	136	10.5	120	6.2	105	6.5	360
3	2.2	61	16.3	185	7.1	121	6.6	366
4	0.9	23	17.0	192	8.8	148	6.6	364
5	0.3	8	10.9	124	13.5	227	6.5	359
6+	0.1	3	14.7	167	56.1	949	20.3	1,119

Continued…

	15-24		25-34		35-44		Total	
	(n=2,696)		(n=1,134)		(n=1,690)		(n=5,521)	
	%	N	%	N	%	N	%	N
Fertility desires								
Wants within 2 years	13.5	363	25.2	286	9.6	162	14.7	811
Wants after 2+ years	31.6	851	10.7	121	0.9	16	17.9	988
Wants, unsure timing	49.5	1,334	15.0	171	2.6	45	28.1	1,550
Wants no more/sterilized/infecund	5.5	148	49.1	557	86.9	1,468	39.4	2,173
Ideal number of children								
0	1.1	30	1.9	21	2.2	37	1.6	89
1	0.5	13	1.2	14	1.2	20	0.8	47
2	7.4	200	9.9	113	8.8	148	8.3	461
3	40.7	1,096	30.2	343	29.6	501	35.1	1,940
4-5	40.9	1,102	43.8	496	40.2	679	41.2	2,277
6+	6.5	176	10.7	122	15.5	263	10.1	560
Non-numeric response	3.0	80	2.3	26	2.5	43	2.7	149
Type of contraception currently used								
Not using	96.3	2,597	96.6	1,096	98.0	1,657	96.9	5,350
LARC/permanent method	0.5	13	1.4	16	0.9	15	0.8	43
Short-term modern method	2.5	67	1.5	17	0.6	9	1.7	93
Traditional method	0.7	19	0.5	6	0.5	9	0.6	34
	(n=665)		(n=628)		(n=1,086)		(n=2,379)	
Unmet need among currently married women								
No need	75.1	500	66.2	416	71.8	780	71.3	1,696
Unmet need	15.7	104	28.4	179	25.3	275	23.4	557
Met need	9.2	61	5.4	34	2.9	31	5.3	126

Appendix Table A4   Current characteristics of women in the Burundi Family Builder I profile, by age

	15-24 (n=1,654)		25-34 (n=1,355)		35-44 (n=299)		Total (n=3,308)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	7.9	131	9.0	122	5.0	15	8.1	268
Rural	92.1	1,523	91.0	1,233	95.0	284	91.9	3,039
Highest education level								
No education	44.3	732	45.7	620	67.2	201	46.9	1,552
Primary	45.0	744	43.9	595	28.7	86	43.1	1,425
Secondary+	10.7	177	10.3	140	4.1	12	10.0	330
Household wealth quintile								
Poorest	23.1	381	21.5	291	21.6	64	22.3	737
Poorer	24.3	403	19.9	269	26.7	80	22.7	752
Middle	21.2	351	21.0	284	20.6	62	21.1	697
Richer	17.9	296	18.9	256	20.9	62	18.6	614
Richest	13.5	223	18.8	255	10.2	31	15.4	508
Ever had sex								
Yes	100.0	1,654	100.0	1,355	100.0	299	100.0	3,308
Mean age at 1st sex (among those who have ever had sex)								
Mean	18.4	1,654	19.7	1,355	20.3	299	19.1	3,308
Marital status								
Never in union	2.1	35	0.3	4	0.0	-	1.2	39
Currently in union/living with a man	91.7	1,516	95.0	1,288	94.4	282	93.3	3,086
Formerly in union/living with a man	6.3	104	4.6	63	5.6	17	5.5	183
Husband/partner's residential status								
Living with her	87.9	1,332	88.9	1,145	94.2	266	88.9	2,742
Staying elsewhere	12.1	184	11.1	143	5.8	16	11.1	343
Marital duration								
Never married	2.1	35	0.3	4	0.0	-	1.2	39
0-4	35.0	578	4.2	56	0.4	1	19.2	635
5-9	47.5	786	16.3	221	2.9	9	30.7	1,016
10-14	15.0	247	38.8	526	4.3	13	23.8	786
15-19	0.5	8	32.7	443	22.7	68	15.7	519
20-24	0.0	-	7.6	103	50.9	152	7.7	255
25-29	0.0	-	0.1	1	18.3	55	1.7	56
30+	0.0	-	0.0	-	0.6	2	0.1	2
Children ever born								
0	0.2	4	0.0	-	0.3	1	0.1	5
1	18.4	305	1.1	15	0.2	1	9.7	320
2	31.6	522	5.2	70	1.4	4	18.0	596
3	26.5	439	13.0	176	1.3	4	18.7	619
4	14.5	240	15.3	207	5.0	15	14.0	462
5	6.5	107	22.3	303	5.6	17	12.9	427
6+	2.2	37	43.2	585	86.2	257	26.6	879

Continued…

	15-24		25-34		35-44		Total	
	(n=1,654)		(n=1,355)		(n=299)		(n=3,308)	
	%	N	%	N	%	N	%	N
Fertility desires								
Wants within 2 years	7.4	122	5.3	72	4.1	12	6.3	207
Wants after 2+ years	67.9	1,123	32.0	434	6.4	19	47.6	1,576
Wants, unsure timing	1.9	32	1.2	17	1.8	5	1.6	54
Wants no more/sterilized/infecund	22.8	377	61.4	832	87.7	262	44.5	1,471
Ideal number of children								
0	0.9	16	1.9	26	1.0	3	1.3	44
1	1.1	18	0.7	9	1.0	3	0.9	30
2	5.6	93	6.1	82	5.3	16	5.8	191
3	34.8	576	27.7	375	27.8	83	31.3	1,034
4-5	48.5	803	44.7	606	48.7	146	47.0	1,555
6+	7.9	130	17.6	238	13.5	40	12.4	409
Non-numeric response	1.1	19	1.3	18	2.6	8	1.4	45
Type of contraception currently used								
Not using	67.5	1,116	73.8	1,000	77.7	232	71.0	2,348
LARC/permanent method	9.1	151	7.9	107	4.0	12	8.2	270
Short-term modern method	17.9	296	12.6	171	11.5	34	15.1	501
Traditional method	5.5	91	5.7	78	6.8	20	5.7	189
	(n=1,516)		(n=1,288)		(n=282)		(n=3,086)	
Unmet need among currently married women								
No need	40.0	607	34.1	440	27.4	77	36.4	1,123
Unmet need	27.5	417	39.5	508	49.1	138	34.5	1,064
Met need	32.5	492	26.4	340	23.5	66	29.1	899

Appendix Table A5   **Current characteristics of women in the Burundi Family Builder II profile, by age**

	15-24		25-34		35-44		Total	
	(n=1,114)		(n=974)		(n=313)		(n=2,400)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	8.3	93	9.1	89	7.0	22	8.5	203
Rural	91.7	1,021	90.9	885	93.0	291	91.5	2,197
Highest education level								
No education	45.7	510	47.5	463	67.9	213	49.4	1,185
Primary	45.5	507	44.0	429	29.3	92	42.8	1,027
Secondary+	8.8	98	8.5	82	2.7	9	7.9	189
Household wealth quintile								
Poorest	24.9	277	22.7	221	19.0	60	23.2	558
Poorer	23.2	259	21.4	208	24.1	75	22.6	542
Middle	21.4	238	19.3	188	20.2	63	20.4	490
Richer	17.7	197	20.8	203	24.7	77	19.9	477
Richest	12.8	143	15.8	154	12.1	38	13.9	334
Ever had sex								
Yes	100.0	1,114	100.0	974	100.0	313	100.0	2,400
Mean age at 1st sex (among those who have ever had sex)								
Mean	18.2	1,114	19.6	974	20.2	313	19.0	2,400
Marital status								
Never in union	5.8	65	1.0	9	0.6	2	3.2	76
Currently in union/living with a man	84.7	943	93.1	906	91.8	287	89.0	2,136
Formerly in union/living with a man	9.5	106	5.9	58	7.6	24	7.8	188
Husband/partner's residential status								
Living with her	86.4	814	87.1	790	92.2	265	87.5	1,869
Staying elsewhere	13.6	129	12.9	117	7.8	23	12.5	268
Marital duration								
Never married	5.8	65	1.0	9	0.6	2	3.2	76
0-4	27.5	307	3.8	37	1.4	4	14.5	349
5-9	51.4	572	15.1	147	3.4	11	30.4	730
10-14	14.3	160	36.6	356	6.2	20	22.3	535
15-19	0.9	10	35.5	346	17.5	55	17.1	411
20-24	0.0	-	7.3	71	45.6	143	8.9	214
25-29	0.0	-	0.6	6	22.2	70	3.2	76
30+	0.0	-	0.0	-	3.1	10	0.4	10
Children ever born								
0	0.1	1	0.0	-	0.0	-	0.0	1
1	24.6	274	2.7	26	0.4	1	12.6	302
2	33.2	370	6.1	60	2.3	7	18.2	437
3	25.2	281	12.3	120	2.8	9	17.1	409
4	11.4	128	19.2	187	3.7	12	13.6	326
5	3.8	43	22.9	223	8.6	27	12.2	292
6+	1.6	18	36.9	359	82.2	257	26.4	634

Continued…

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	15-24		25-34		35-44		Total	
	(n=1,114)		**(n=974)**		**(n=313)**		**(n=2,400)**	
	%	**N**	**%**	**N**	**%**	**N**	**%**	**N**
Fertility desires								
Wants within 2 years	14.1	157	8.8	85	5.8	18	10.9	261
Wants after 2+ years	56.8	632	28.3	276	4.4	14	38.4	922
Wants, unsure timing	4.4	49	3.0	29	1.2	4	3.4	82
Wants no more/sterilized/infecund	24.7	275	59.9	583	88.6	277	47.3	1,136
Ideal number of children								
0	1.0	11	1.4	14	2.9	9	1.4	34
1	1.2	14	0.5	4	0.7	2	0.8	20
2	7.7	86	5.1	50	7.4	23	6.6	159
3	32.1	358	28.6	279	30.0	94	30.4	731
4-5	48.4	540	45.6	444	46.3	145	47.0	1,128
6+	7.3	81	15.5	151	11.1	35	11.1	266
Non-numeric response	2.2	24	3.4	33	1.5	5	2.6	62
Type of contraception currently used								
Not using	84.1	937	86.6	843	83.3	261	85.0	2,041
LARC/permanent method	5.2	58	3.8	37	2.7	8	4.3	103
Short-term modern method	8.5	95	5.1	49	6.9	22	6.9	166
Traditional method	2.2	24	4.6	45	7.1	22	3.8	91
	(n=943)		**(n=906)**		**(n=287)**		**(n=2,136)**	
Unmet need among currently married women								
No need	40.1	378	33.7	306	25.9	74	35.5	758
Unmet need	43.4	410	52.3	474	55.9	161	48.9	1,045
Met need	16.5	155	13.9	126	18.2	52	15.6	334

Appendix Table A6   **Current characteristics of women in the Burundi Modern Mother profile, by age**

	15-24 (n=404)		25-34 (n=435)		35-44 (n=168)		Total (n=1,007)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	14.7	59	22.8	99	11.8	20	17.7	179
Rural	85.3	344	77.2	336	88.2	148	82.3	828
Highest education level								
No education	42.4	171	40.8	177	58.4	98	44.4	447
Primary	42.7	173	43.0	187	31.9	54	41.0	413
Secondary+	14.9	60	16.2	71	9.7	16	14.6	147
Household wealth quintile								
Poorest	23.7	96	19.4	84	20.3	34	21.3	214
Poorer	19.6	79	17.2	75	19.2	32	18.5	187
Middle	19.5	79	15.5	68	18.3	31	17.6	177
Richer	14.6	59	14.7	64	17.8	30	15.2	153
Richest	22.7	91	33.1	144	24.3	41	27.5	276
Ever had sex								
No	0.7	3	0.0	-	0.0	-	0.3	3
Yes	99.3	401	100.0	435	100.0	168	99.7	1,004
Mean age at 1st sex (among those who have ever had sex)								
Mean	18.0	401	19.2	435	19.8	168	18.8	1,004
Marital status								
Never in union	6.3	26	0.6	3	0.7	1	2.9	29
Currently in union/living with a man	89.1	360	92.6	403	90.6	152	90.9	915
Formerly in union/living with a man	4.5	18	6.8	30	8.7	15	6.2	63
Husband/partner's residential status								
Living with her	86.9	313	90.8	366	92.0	140	89.5	818
Staying elsewhere	13.1	47	9.2	37	8.0	12	10.5	96
Marital duration								
Never married	6.3	26	0.6	3	0.7	1	2.9	29
0-4	19.3	78	3.5	15	0.0	-	9.2	93
5-9	56.8	229	12.3	54	0.3	1	28.2	284
10-14	17.1	69	35.9	156	4.0	7	23.0	232
15-19	0.5	2	34.4	150	20.6	35	18.5	186
20-24	0.0	-	13.1	57	44.0	74	13.0	131
25-29	0.0	-	0.2	1	26.7	45	4.6	46
30+	0.0	-	0.0	-	3.6	6	0.6	6
Children ever born								
0	1.7	7	0.0	-	0.0	-	0.7	7
1	19.9	80	0.7	3	1.6	3	8.5	86
2	40.4	163	8.8	38	0.6	1	20.1	203
3	25.8	104	17.2	75	3.6	6	18.4	185
4	9.7	39	25.3	110	6.0	10	15.8	159
5	2.3	9	21.4	93	22.0	37	13.8	139
6+	0.2	1	26.6	116	66.2	111	22.7	228

Continued…

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	15-24 (n=404)		25-34 (n=435)		35-44 (n=168)		Total (n=1,007)	
	%	N	%	N	%	N	%	N
Fertility desires								
Wants within 2 years	19.8	80	9.6	42	2.6	4	12.6	126
Wants after 2+ years	57.3	231	20.6	90	2.8	5	32.3	326
Wants, unsure timing	3.7	15	2.5	11	2.0	3	2.9	29
Wants no more/sterilized/infecund	19.2	77	67.3	293	92.5	155	52.2	525
Ideal number of children								
0	1.7	7	0.6	3	1.6	3	1.2	13
1	2.2	9	2.3	10	2.1	4	2.2	22
2	7.4	30	7.7	34	12.3	21	8.3	84
3	36.5	147	37.2	162	39.2	66	37.3	375
4-5	48.0	194	43.5	189	32.5	55	43.5	438
6+	3.8	16	6.5	28	11.0	19	6.2	62
Non-numeric response	0.3	1	2.1	9	1.3	2	1.3	13
Type of contraception currently used								
Not using	34.9	141	29.0	126	18.5	31	29.6	298
LARC/permanent method	7.4	30	13.5	59	13.9	23	11.1	112
Short-term modern method	55.9	226	53.3	232	61.1	103	55.6	560
Traditional method	1.8	7	4.2	18	6.6	11	3.6	37
	(n=360)		(n=403)		(n=152)		(n=915)	
Unmet need among currently married women								
No need	25.2	91	14.9	60	4.1	6	17.2	157
Unmet need	10.2	37	12.7	51	12.2	19	11.6	106
Met need	64.6	232	72.4	291	83.8	128	71.2	651

Appendix Table A7   Current characteristics of women in the Burundi Consistently Covered Mother profile, by age

	15-24 (n=273)		25-34 (n=324)		35-44 (n=153)		Total (n=750)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	10.0	27	10.8	35	9.8	15	10.3	77
Rural	90.0	246	89.2	289	90.2	138	89.7	673
Highest education level								
No education	44.8	122	43.7	142	67.6	104	49.0	367
Primary	40.6	111	48.2	157	24.6	38	40.7	305
Secondary+	14.5	40	8.1	26	7.7	12	10.4	78
Household wealth quintile								
Poorest	21.2	58	17.6	57	10.6	16	17.5	131
Poorer	18.0	49	14.3	46	23.3	36	17.5	131
Middle	26.3	72	21.1	69	27.0	41	24.2	182
Richer	17.5	48	23.6	77	19.7	30	20.6	155
Richest	17.0	46	23.3	76	19.4	30	20.2	152
Ever had sex								
Yes	100.0	273	100.0	324	100.0	153	100.0	750
Mean age at 1st sex (among those who have ever had sex)								
Mean	17.6	273	18.7	324	19.0	153	18.3	750
Marital status								
Never in union	2.3	6	0.5	2	0.7	1	1.2	9
Currently in union/living with a man	93.6	255	92.6	301	90.8	139	92.6	695
Formerly in union/living with a man	4.2	11	6.9	22	8.4	13	6.2	47
Husband/partner's residential status								
Living with her	89.6	228	89.2	268	94.0	131	90.3	627
Staying elsewhere	10.4	27	10.8	32	6.0	8	9.7	67
Marital duration								
Never married	2.3	6	0.5	2	0.7	1	1.2	9
0-4	11.3	31	1.4	5	0.0	-	4.7	35
5-9	59.2	161	10.9	35	0.6	1	26.3	198
10-14	23.7	65	33.5	109	1.5	2	23.4	176
15-19	3.5	10	42.5	138	15.2	23	22.7	171
20-24	0.0	-	11.2	36	41.0	63	13.2	99
25-29	0.0	-	0.0	-	35.3	54	7.2	54
30+	0.0	-	0.0	-	5.7	9	1.2	9
Children ever born								
0	10.5	29	1.3	4	0.0	-	4.4	33
1	39.2	107	7.4	24	0.4	1	17.5	132
2	33.7	92	18.3	60	2.2	3	20.6	155
3	12.6	34	19.8	64	13.6	21	16.0	120
4	2.3	6	27.7	90	17.7	27	16.4	123
5	1.6	4	25.5	83	66.1	101	25.1	188
Fertility desires								
Wants within 2 years	16.6	45	13.5	44	2.5	4	12.4	93
Wants after 2+ years	50.1	137	17.9	58	3.1	5	26.6	200
Wants, unsure timing	3.7	10	0.2	1	0.6	1	1.6	12
Wants no more/sterilized/infecund	29.6	81	68.4	222	93.7	144	59.5	446

Continued…

| | 15-24 | | 25-34 | | 35-44 | | Total | |
| | (n=273) | | (n=324) | | (n=153) | | (n=750) | |
	%	N	%	N	%	N	%	N
Ideal number of children								
0	2.1	6	1.5	5	1.0	2	1.6	12
1	1.5	4	1.4	5	0.8	1	1.3	10
2	7.8	21	8.1	26	8.2	13	8.0	60
3	37.1	101	40.5	131	32.5	50	37.6	282
4-5	46.1	126	39.7	129	40.9	63	42.3	317
6+	5.1	14	7.8	25	15.9	24	8.5	64
Non-numeric response	0.3	1	1.1	4	0.8	1	0.7	6
Type of contraception currently used								
Not using	34.8	95	32.1	104	20.1	31	30.6	230
LARC/permanent method	55.2	151	59.6	193	74.7	114	61.1	458
Short-term modern method	8.9	24	6.3	21	3.3	5	6.6	50
Traditional method	1.1	3	2.0	7	2.0	3	1.7	13
	(n=255)		(n=301)		(n=139)		(n=695)	
Unmet need among currently married women								
No need	28.4	72	22.9	69	8.5	12	22.0	153
Unmet need	7.2	18	9.9	30	9.4	13	8.8	61
Met need	64.4	164	67.3	202	82.2	114	69.2	481

Appendix Table A8   Current characteristics of women in the Burundi Traditional Mother profile, by age

	15-24		25-34		35-44		Total	
	(n=84)		(n=149)		(n=74)		(n=308)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	13.1	11	22.6	34	28.1	21	21.3	66
Rural	86.9	73	77.4	115	71.9	54	78.7	242
Highest education level								
No education	24.6	21	31.2	47	48.2	36	33.5	103
Primary	56.1	47	44.4	66	31.3	23	44.4	137
Secondary+	19.3	16	24.4	36	20.5	15	22.1	68
Household wealth quintile								
Poorest	11.1	9	13.0	19	8.8	7	11.5	35
Poorer	21.6	18	9.6	14	16.9	13	14.6	45
Middle	16.1	14	14.6	22	11.9	9	14.4	44
Richer	23.1	20	25.5	38	23.3	17	24.3	75
Richest	28.1	24	37.2	56	39.0	29	35.2	108
Ever had sex								
No	0.0	-	0.4	1	1.6	1	0.6	2
Yes	100.0	84	99.6	148	98.4	73	99.4	306
Mean age at 1st sex (among those who have ever had sex)								
Mean	19.7	84	20.0	148	19.9	73	19.9	306
Marital status								
Never in union	2.0	2	0.4	1	1.6	1	1.1	4
Currently in union/living with a man	98.0	82	98.1	146	98.1	73	98.1	302
Formerly in union/living with a man	0.0	-	1.4	2	0.3	0	0.8	2
Husband/partner's residential status								
Living with her	88.3	73	92.8	136	87.7	64	90.3	273
Staying elsewhere	11.7	10	7.2	11	12.3	9	9.7	29
Marital duration								
Never married	2.0	2	0.4	1	1.6	1	1.1	4
0-4	26.2	22	3.3	5	0.0	-	8.8	27
5-9	58.2	49	12.7	19	0.0	-	22.1	68
10-14	13.6	11	34.1	51	4.5	3	21.3	66
15-19	0.0	-	35.5	53	18.1	14	21.6	66
20-24	0.0	-	13.3	20	35.5	26	15.1	46
25-29	0.0	-	0.6	1	35.8	27	8.9	28
30+	0.0	-	0.0	-	4.4	3	1.1	3
Children ever born								
0	1.5	1	1.1	2	1.6	1	1.3	4
1	13.3	11	0.6	1	0.0	-	3.9	12
2	49.2	41	7.0	11	0.0	-	16.9	52
3	24.1	20	9.4	14	4.0	3	12.1	37
4	9.1	8	24.4	36	13.1	10	17.5	54
5	2.9	2	21.6	32	15.4	12	15.0	46
6+	0.0	-	35.7	53	65.9	49	33.2	102

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	15-24		25-34		35-44		Total	
	(n=84)		(n=149)		(n=74)		(n=308)	
	%	N	%	N	%	N	%	N
Fertility desires								
Wants within 2 years	17.7	15	9.6	14	5.0	4	10.7	33
Wants after 2+ years	70.4	59	29.6	44	0.9	1	33.8	104
Wants, unsure timing	1.6	1	2.9	4	1.2	1	2.1	7
Wants no more/sterilized/infecund	10.4	9	58.0	86	92.9	69	53.4	164
Ideal number of children								
0	3.0	3	0.0	-	1.6	1	1.2	4
1	0.0	-	4.7	7	3.2	2	3.0	9
2	4.9	4	2.1	3	12.6	9	5.4	17
3	47.1	40	30.3	45	32.3	24	35.4	109
4-5	44.0	37	47.1	70	35.6	27	43.4	134
6+	1.0	1	14.7	22	13.9	10	10.8	33
Non-numeric response	0.0	-	1.1	2	0.9	1	0.7	2
Type of contraception currently used								
Not using	25.8	22	22.1	33	15.3	11	21.4	66
LARC/permanent method	0.0	-	2.2	3	0.0	-	1.1	3
Short-term modern method	2.2	2	1.5	2	0.0	-	1.3	4
Traditional method	72.0	61	74.2	111	84.7	63	76.1	234
	(n=82)		(n=146)		(n=73)		(n=302)	
Unmet need among currently married women								
No need	15.7	13	12.3	18	5.5	4	11.6	35
Unmet need	10.6	9	8.9	13	10.1	7	9.6	29
Met need	73.7	61	78.8	115	84.4	62	78.7	238

Appendix Table A9   Current characteristics of women in the Nepal Quiet Calendar profile, by age

	15-24 (n=1,882)		25-34 (n=989)		35-44 (n=789)		Total (n=3,659)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	68.1	1,281	63.8	631	61.7	486	65.5	2,398
Rural	31.9	601	36.2	358	38.3	302	34.5	1,261
Highest education level								
No education	13.0	244	42.3	418	66.0	521	32.3	1,183
Primary	12.3	231	20.3	201	15.2	120	15.1	552
Secondary+	74.8	1,407	37.4	370	18.8	148	52.6	1,925
Household wealth quintile								
Poorest	12.0	226	14.7	146	19.7	156	14.4	527
Poorer	17.7	333	20.1	199	19.0	150	18.6	682
Middle	19.1	359	17.3	171	19.5	154	18.7	684
Richer	24.6	463	22.8	225	19.8	156	23.1	845
Richest	26.6	500	25.1	248	22.0	174	25.2	922
Ever had sex								
No	35.7	672	5.1	50	3.7	29	20.5	751
Yes	64.3	1,210	94.9	939	96.3	760	79.5	2,908
Mean age at 1st sex (among those who have ever had sex)								
Mean	18.7	1,210	18.0	939	18.4	760	18.4	2,908
Marital status								
Never in union	35.8	674	5.3	52	4.2	33	20.7	759
Currently in union/living with a man	62.4	1,175	88.1	872	79.5	627	73.1	2,674
Formerly in union/living with a man	1.7	33	6.6	65	16.3	129	6.2	226
Husband/partner's residential status								
Living with her	48.5	570	44.4	387	70.5	442	52.3	1,399
Staying elsewhere	51.5	605	55.6	485	29.5	185	47.7	1,275
Marital duration								
Never married	35.8	674	5.3	52	4.2	33	20.7	759
0-4	31.9	601	2.0	20	0.2	2	17.0	623
5-9	19.2	362	7.2	72	1.4	11	12.1	444
10-14	12.2	229	23.5	232	1.9	15	13.0	476
15-19	0.8	16	41.6	411	6.5	52	13.1	478
20-24	0.0	-	18.4	182	25.2	199	10.4	381
25-29	0.0	-	2.0	20	39.1	308	9.0	328
30+	0.0	-	0.0	-	21.5	170	4.6	170
Children ever born								
0	59.0	1,111	12.1	120	9.0	71	35.6	1,302
1	24.9	469	16.0	159	9.5	75	19.2	702
2	11.4	215	30.9	306	17.4	137	18.0	658
3	3.6	68	20.0	198	19.6	155	11.5	420
4	0.8	15	11.4	113	15.0	118	6.7	247
5	0.2	3	5.8	58	12.2	96	4.3	158
6+	0.1	1	3.6	36	17.3	136	4.7	173

Continued…

	15-24 (n=1,882)		25-34 (n=989)		35-44 (n=789)		Total (n=3,659)	
	%	N	%	N	%	N	%	N
Fertility desires								
Wants within 2 years	19.3	363	13.8	136	2.8	22	14.2	521
Wants after 2+ years	24.3	458	2.4	24	0.2	2	13.2	484
Wants, unsure timing	35.3	664	6.9	68	1.6	12	20.3	744
Wants no more/sterilized/infecund	21.1	397	76.9	761	95.4	753	52.2	1,911
Ideal number of children								
0	1.8	34	3.0	29	3.8	30	2.6	94
1	22.0	415	10.7	106	8.0	63	15.9	583
2	67.4	1,268	61.4	607	50.7	400	62.2	2,276
3	7.4	139	17.6	174	22.1	174	13.3	488
4-5	1.0	18	6.4	64	12.9	102	5.0	183
6+	0.1	2	0.0	-	1.3	10	0.3	11
Non-numeric response	0.3	6	0.9	8	1.2	10	0.7	24
Type of contraception currently used								
Not using	90.0	1,694	87.8	868	96.2	759	90.7	3,320
LARC/permanent method	2.9	54	3.4	34	1.2	10	2.6	97
Short-term modern method	4.9	92	5.9	59	1.6	13	4.5	164
Traditional method	2.2	42	2.9	29	1.0	8	2.1	79
	(n=1,175)		(n=872)		(n=627)		(n=2,674)	
Unmet need among currently married women								
No need	50.4	592	44.0	384	65.8	412	51.9	1,388
Unmet need	33.7	396	42.1	367	29.4	185	35.4	948
Met need	15.9	187	13.9	121	4.8	30	12.6	338

Appendix Table A10   Current characteristics of women in the Nepal Consistently Covered profile, by age

	15-24 (n=196)		25-34 (n=957)		35-44 (n=1,022)		Total (n=2,174)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	56.2	110	62.5	598	64.1	655	62.7	1,363
Rural	43.8	86	37.5	359	35.9	367	37.3	812
Highest education level								
No education	44.8	88	58.5	560	71.9	734	63.6	1,382
Primary	24.9	49	19.6	188	13.0	133	17.0	370
Secondary+	30.3	59	21.8	209	15.1	155	19.4	423
Household wealth quintile								
Poorest	14.8	29	14.4	137	11.4	116	13.0	282
Poorer	20.7	41	20.3	194	20.8	212	20.6	447
Middle	28.5	56	24.9	238	23.1	236	24.4	531
Richer	17.6	34	21.6	206	24.0	245	22.3	486
Richest	18.5	36	18.9	181	20.7	212	19.7	428
Ever had sex								
Yes	100.0	196	100.0	957	100.0	1,022	100.0	2,174
Mean age at 1st sex (among those who have ever had sex)								
Mean	16.1	196	16.6	957	17.0	1,022	16.7	2,174
Marital status								
Currently in union/living with a man	98.7	193	98.7	945	96.8	989	97.8	2,126
Formerly in union/living with a man	1.3	3	1.3	12	3.2	33	2.2	48
Husband/partner's residential status								
Living with her	70.5	136	74.3	702	85.7	847	79.3	1,686
Staying elsewhere	29.5	57	25.7	242	14.3	141	20.7	441
Marital duration								
0-4	1.3	3	0.1	1	0.0	-	0.2	4
5-9	34.9	68	0.9	9	0.0	-	3.5	77
10-14	57.7	113	14.5	138	0.3	3	11.7	254
15-19	6.1	12	46.4	444	1.6	17	21.7	472
20-24	0.0	-	35.9	343	26.3	268	28.1	612
25-29	0.0	-	2.3	22	45.4	464	22.3	486
30+	0.0	-	0.0	-	26.4	270	12.4	270
Children ever born								
0	1.9	4	0.3	3	0.1	1	0.4	8
1	8.5	17	1.5	14	0.8	8	1.8	39
2	51.1	100	32.2	308	18.9	193	27.6	601
3	32.7	64	31.9	305	29.3	299	30.7	668
4	4.1	8	20.8	199	23.8	243	20.7	450
5	1.7	3	8.3	79	13.0	133	9.9	216
6+	0.0	-	5.0	48	14.2	145	8.9	193
Fertility desires								
Wants within 2 years	2.1	4	0.7	7	0.0	-	0.5	11
Wants after 2+ years	3.1	6	0.1	1	0.0	-	0.3	7
Wants, unsure timing	0.1	0	0.1	1	0.1	1	0.1	3
Wants no more/sterilized/infecund	94.8	186	99.1	948	99.9	1,021	99.1	2,154

Continued…

Appendix Table A10—*Continued*

	15-24		25-34		35-44		Total	
	(n=196)		(n=957)		(n=1,022)		(n=2,174)	
	%	N	%	N	%	N	%	N
Ideal number of children								
0	0.5	1	0.5	5	0.4	4	0.4	10
1	9.0	18	6.3	60	5.2	53	6.0	131
2	63.9	125	56.4	539	56.2	574	57.0	1,239
3	24.4	48	30.8	295	30.2	308	29.9	651
4-5	2.2	4	5.7	54	7.5	76	6.2	135
6+	0.0	-	0.1	1	0.4	4	0.2	5
Non-numeric response	0.0	-	0.3	3	0.1	1	0.2	4
Type of contraception currently used								
Not using	4.9	10	1.2	11	1.2	12	1.5	33
LARC/permanent method	92.8	182	97.5	933	97.9	1,000	97.3	2,114
Short-term modern method	1.8	4	1.0	9	0.5	5	0.8	18
Traditional method	0.5	1	0.3	3	0.5	5	0.4	9
	(n=193)		(n=945)		(n=989)		(n=2,126)	
Unmet need among currently married women								
No need	1.1	2	0.4	4	0.3	3	0.4	9
Unmet need	3.9	8	0.8	7	0.6	6	1.0	21
Met need	95.1	184	98.8	933	99.1	980	98.6	2,097

Appendix Table A11   Current characteristics of women in the Nepal Family Builder profile, by age

	15-24 (n=1,498)		25-34 (n=438)		35-44 (n=79)		Total (n=2,016)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	54.7	820	56.5	248	58.7	47	55.3	1,114
Rural	45.3	678	43.5	191	41.3	33	44.7	901
Highest education level								
No education	30.3	454	47.3	207	77.8	62	35.8	722
Primary	20.2	303	20.6	90	11.1	9	19.9	402
Secondary+	49.5	742	32.1	141	11.1	9	44.2	892
Household wealth quintile								
Poorest	19.3	289	26.6	117	31.3	25	21.4	431
Poorer	22.8	342	19.3	85	19.6	16	21.9	442
Middle	23.2	348	20.2	88	15.9	13	22.3	449
Richer	21.2	317	17.1	75	16.9	13	20.1	406
Richest	13.5	202	16.7	73	16.4	13	14.3	289
Ever had sex								
Yes	100.0	1,498	100.0	438	100.0	79	100.0	2,016
Mean age at 1st sex (among those who have ever had sex)								
Mean	17.7	1,498	19.1	438	18.3	79	18.0	2,016
Marital status								
Currently in union/living with a man	99.2	1,486	98.9	433	96.7	77	99.0	1,996
Formerly in union/living with a man	0.8	12	1.1	5	3.3	3	1.0	20
Husband/partner's residential status								
Living with her	50.7	753	56.9	247	74.7	57	52.9	1,057
Staying elsewhere	49.3	733	43.1	187	25.3	19	47.1	940
Marital duration								
0-4	35.4	531	5.2	23	1.1	1	27.5	555
5-9	45.4	679	13.0	57	0.0	-	36.5	736
10-14	18.3	274	34.2	150	1.5	1	21.1	425
15-19	1.0	14	37.2	163	12.6	10	9.3	187
20-24	0.0	-	10.4	46	29.5	24	3.4	69
25-29	0.0	-	0.0	-	35.3	28	1.4	28
30+	0.0	-	0.0	-	20.0	16	0.8	16
Children ever born								
0	2.1	32	0.0	-	0.0	-	1.6	32
1	35.9	538	11.4	50	2.0	2	29.2	589
2	34.1	510	25.3	111	14.1	11	31.4	632
3	18.6	279	22.5	98	20.3	16	19.5	394
4	7.1	106	14.2	62	16.5	13	9.0	182
5	1.5	23	11.7	51	18.6	15	4.4	89
6+	0.7	11	14.9	65	28.6	23	4.9	99
Fertility desires								
Wants within 2 years	11.2	168	7.1	31	1.3	1	10.0	201
Wants after 2+ years	24.6	368	3.8	17	1.4	1	19.2	386
Wants, unsure timing	4.1	61	1.9	8	0.0	-	3.4	69
Wants no more/sterilized/infecund	60.1	901	87.2	382	97.2	77	67.5	1,360

Continued…

Appendix Table A11—*Continued*

	15-24		25-34		35-44		Total	
	(n=1,498)		(n=438)		(n=79)		(n=2,016)	
	%	N	%	N	%	N	%	N
Ideal number of children								
0	1.0	15	0.3	1	1.6	1	0.9	18
1	11.4	171	8.3	36	7.4	6	10.6	214
2	66.3	994	56.7	248	57.0	45	63.9	1,288
3	17.2	258	24.3	107	19.9	16	18.9	381
4-5	3.4	50	9.2	40	14.1	11	5.1	102
6+	0.2	3	1.2	5	0.0	-	0.4	8
Non-numeric response	0.4	6	0.0	-	0.0	-	0.3	6
Type of contraception currently used								
Not using	66.4	995	59.8	262	63.1	50	64.8	1,307
LARC/permanent method	12.4	186	16.9	74	22.6	18	13.8	278
Short-term modern method	11.5	172	12.8	56	2.9	2	11.4	230
Traditional method	9.7	146	10.4	46	11.4	9	9.9	201
	(n=1,486)		(n=433)		(n=77)		(n=1,996)	
Unmet need among currently married women								
No need	25.7	382	18.7	81	16.1	12	23.8	476
Unmet need	40.5	601	40.7	176	45.7	35	40.7	813
Met need	33.8	503	40.7	176	38.2	29	35.5	708

Appendix Table A12 **Current characteristics of women in the Nepal Consistently Modern profile, by age**

	15-24		25-34		35-44		Total	
	(n=230)		(n=474)		(n=301)		(n=1,006)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	73.7	170	69.2	328	68.1	205	69.9	703
Rural	26.3	61	30.8	146	31.9	96	30.1	303
Highest education level								
No education	21.5	49	36.8	174	65.3	197	41.8	421
Primary	25.3	58	24.1	114	15.7	47	21.9	220
Secondary+	53.2	123	39.1	185	19.1	57	36.3	365
Household wealth quintile								
Poorest	12.2	28	16.2	77	25.6	77	18.1	182
Poorer	17.4	40	19.4	92	17.6	53	18.4	185
Middle	20.2	47	15.1	72	16.1	49	16.6	167
Richer	23.0	53	19.0	90	11.2	34	17.6	177
Richest	27.2	63	30.2	143	29.5	89	29.3	295
Ever had sex								
Yes	100.0	230	100.0	474	100.0	301	100.0	1,006
Mean age at 1st sex (among those who have ever had sex)								
Mean	17.2	230	18.4	474	18.5	301	18.2	1,006
Marital status								
Currently in union/living with a man	99.5	229	99.3	471	98.0	295	99.0	995
Formerly in union/living with a man	0.5	1	0.7	3	2.0	6	1.0	10
Husband/partner's residential status								
Living with her	74.0	170	82.3	387	92.7	274	83.5	831
Staying elsewhere	26.0	60	17.7	83	7.3	22	16.5	164
Marital duration								
0-4	1.4	3	0.1	0	0.0	-	0.4	4
5-9	55.8	129	7.5	36	0.0	-	16.3	164
10-14	39.2	90	30.9	147	3.2	10	24.5	246
15-19	3.6	8	40.3	191	10.1	31	22.9	230
20-24	0.0	-	20.2	96	31.7	96	19.0	191
25-29	0.0	-	1.0	5	40.9	123	12.7	128
30+	0.0	-	0.0	-	14.1	43	4.2	43
Children ever born								
0	2.9	7	0.5	2	0.0	-	0.9	9
1	33.6	78	9.3	44	3.4	10	13.1	132
2	48.9	113	45.4	215	21.6	65	39.1	393
3	9.1	21	21.8	103	20.5	62	18.5	186
4	3.5	8	14.1	67	15.3	46	12.0	121
5	2.0	5	5.4	26	18.1	55	8.4	85
6+	0.0	-	3.5	17	21.1	63	8.0	80
Fertility desires								
Wants within 2 years	9.8	23	3.2	15	0.0	-	3.7	38
Wants after 2+ years	13.4	31	1.6	7	0.0	-	3.8	38
Wants, unsure timing	8.2	19	0.5	2	0.0	-	2.1	21
Wants no more/sterilized/infecund	68.6	158	94.8	449	100.0	301	90.3	909

Continued…

	15-24		25-34		35-44		Total	
	(n=230)		(n=474)		(n=301)		(n=1,006)	
	%	N	%	N	%	N	%	N
Ideal number of children								
0	1.9	4	1.1	5	0.7	2	1.2	12
1	16.3	38	8.4	40	4.2	13	8.9	90
2	73.9	170	75.7	359	62.0	187	71.2	716
3	6.5	15	11.1	53	20.2	61	12.8	128
4-5	1.5	4	3.7	17	12.2	37	5.7	58
Non-numeric response	0.0	-	0.0	-	0.8	3	0.2	3
Type of contraception currently used								
Not using	25.5	59	17.5	83	18.9	57	19.7	199
LARC/permanent method	27.3	63	24.9	118	25.0	75	25.5	256
Short-term modern method	44.0	101	52.3	248	50.2	151	49.8	501
Traditional method	3.2	7	5.3	25	5.9	18	5.0	50
	(n=229)		(n=471)		(n=295)		(n=995)	
Unmet need among currently married women								
No need	10.0	23	3.3	16	6.5	19	5.8	58
Unmet need	15.2	35	13.6	64	10.8	32	13.1	131
Met need	74.8	172	83.1	391	82.7	244	81.1	807

Appendix Table A13   Current characteristics of women in the Nepal Modern Mother profile, by age

	15-24 (n=427)		25-34 (n=226)		35-44 (n=44)		Total (n=697)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	63.9	273	56.7	128	63.3	28	61.5	429
Rural	36.1	154	43.3	98	36.7	16	38.5	268
Highest education level								
No education	18.5	79	42.7	96	76.2	34	30.0	209
Primary	19.1	82	23.7	54	8.4	4	19.9	139
Secondary+	62.4	267	33.6	76	15.4	7	50.1	349
Household wealth quintile								
Poorest	17.3	74	25.8	58	35.9	16	21.2	148
Poorer	18.2	78	19.3	44	11.4	5	18.1	126
Middle	19.2	82	13.6	31	13.4	6	17.0	119
Richer	22.5	96	22.6	51	12.7	6	21.9	153
Richest	22.8	97	18.8	42	26.5	12	21.7	151
Ever had sex								
Yes	100.0	427	100.0	226	100.0	44	100.0	697
Mean age at 1st sex (among those who have ever had sex)								
Mean	17.8	427	18.4	226	18.6	44	18.0	697
Marital status								
Never in union	0.0	-	0.6	1	0.0	-	0.2	1
Currently in union/living with a man	100.0	427	98.7	223	100.0	44	99.6	694
Formerly in union/living with a man	0.0	-	0.7	2	0.0	-	0.2	2
Husband/partner's residential status								
Living with her	78.1	334	80.4	179	84.1	37	79.2	550
Staying elsewhere	21.9	94	19.6	44	15.9	7	20.8	144
Marital duration								
Never married	0.0	-	0.6	1	0.0	-	0.2	1
0-4	27.2	116	2.3	5	0.0	-	17.4	121
5-9	52.3	223	11.1	25	0.0	-	35.7	249
10-14	19.1	82	26.7	60	3.5	2	20.6	144
15-19	1.5	6	42.1	95	10.7	5	15.2	106
20-24	0.0	-	16.7	38	54.8	24	8.9	62
25-29	0.0	-	0.5	1	20.0	9	1.4	10
30+	0.0	-	0.0	-	11.0	5	0.7	5
Children ever born								
0	3.1	13	0.7	2	0.0	-	2.1	15
1	38.4	164	5.6	13	4.9	2	25.7	179
2	39.5	169	30.8	70	21.5	9	35.5	248
3	12.5	53	23.2	53	12.2	5	15.9	111
4	5.0	21	16.1	37	6.3	3	8.7	60
5	1.3	6	13.9	31	16.2	7	6.3	44
6+	0.3	1	9.6	22	38.9	17	5.8	40
Fertility desires								
Wants within 2 years	7.8	34	2.4	6	2.7	1	5.8	40
Wants after 2+ years	18.4	79	4.9	11	0.0	-	12.9	90
Wants, unsure timing	4.4	19	1.1	3	0.0	-	3.1	22
Wants no more/sterilized/infecund	69.3	296	91.5	207	97.3	43	78.3	546

Continued…

	15-24		25-34		35-44		Total	
	(n=427)		(n=226)		(n=44)		(n=697)	
	%	N	%	N	%	N	%	N
Ideal number of children								
0	0.4	2	0.0	-	3.9	2	0.5	3
1	16.3	70	5.7	13	1.2	1	12.0	83
2	70.4	301	70.5	159	53.6	24	69.4	484
3	9.8	42	18.9	43	23.0	10	13.6	95
4-5	2.8	12	4.5	10	18.2	8	4.3	30
6+	0.0	-	0.3	1	0.0	-	0.1	1
Non-numeric response	0.3	1	0.0	-	0.0	-	0.2	1
Type of contraception currently used								
Not using	27.0	115	24.9	56	17.9	8	25.8	180
LARC/permanent method	21.0	90	24.3	55	39.6	17	23.3	162
Short-term modern method	45.6	195	44.1	100	33.9	15	44.4	310
Traditional method	6.3	27	6.6	15	8.7	4	6.6	46
	(n=427)		(n=223)		(n=44)		(n=694)	
Unmet need among currently married women								
No need	9.9	42	3.9	9	4.8	2	7.6	53
Unmet need	17.1	73	20.0	45	13.1	6	17.8	124
Met need	73.0	312	76.1	170	82.1	36	74.6	518

Appendix Table A14   **Current characteristics of women in the Nepal Consistently Traditional profile, by age**

	15-24		25-34		35-44		Total	
	(n=132)		(n=286)		(n=217)		(n=635)	
	%	N	%	N	%	N	%	N
Type of place of residence								
Urban	68.2	90	66.4	190	65.1	141	66.3	421
Rural	31.8	42	33.6	96	34.9	76	33.7	214
Highest education level								
No education	14.5	19	24.5	70	50.4	109	31.3	199
Primary	12.1	16	18.6	53	18.7	41	17.3	110
Secondary+	73.4	97	56.8	163	30.9	67	51.4	327
Household wealth quintile								
Poorest	12.0	16	14.1	40	14.1	31	13.7	87
Poorer	12.1	16	16.8	48	20.5	44	17.1	109
Middle	15.1	20	9.0	26	20.6	45	14.2	90
Richer	19.1	25	15.3	44	12.4	27	15.1	96
Richest	41.6	55	44.8	128	32.4	70	39.9	254
Ever had sex								
Yes	100.0	132	100.0	286	100.0	217	100.0	635
Mean age at 1st sex (among those who have ever had sex)								
Mean	18.3	132	18.5	286	18.5	217	18.5	635
Marital status								
Currently in union/living with a man	100.0	132	100.0	286	98.9	214	99.6	633
Formerly in union/living with a man	0.0	-	0.0	-	1.1	2	0.4	2
Husband/partner's residential status								
Living with her	71.0	94	88.9	254	93.7	201	86.8	549
Staying elsewhere	29.0	38	11.1	32	6.3	14	13.2	84
Marital duration								
0-4	14.8	20	0.0	-	0.0	-	3.1	20
5-9	60.2	80	5.9	17	1.0	2	15.5	99
10-14	20.4	27	34.4	98	2.1	5	20.4	130
15-19	4.6	6	38.6	111	6.9	15	20.7	132
20-24	0.0	-	20.1	58	31.8	69	19.9	127
25-29	0.0	-	1.0	3	38.4	83	13.6	86
30+	0.0	-	0.0	-	19.8	43	6.7	43
Children ever born								
0	3.9	5	0.7	2	0.0	-	1.1	7
1	47.6	63	18.3	52	4.2	9	19.6	124
2	28.4	38	39.9	114	24.3	53	32.2	204
3	13.1	17	20.6	59	28.0	61	21.6	137
4	4.8	6	12.1	35	14.6	32	11.4	73
5	2.3	3	6.1	17	10.9	24	6.9	44
6+	0.0	-	2.4	7	17.9	39	7.2	46
Fertility desires								
Wants within 2 years	12.5	17	3.4	10	0.5	1	4.3	28
Wants after 2+ years	23.8	31	2.8	8	0.0	-	6.2	40
Wants, unsure timing	4.6	6	2.7	8	0.0	-	2.2	14
Wants no more/sterilized/infecund	59.2	78	91.0	261	99.5	216	87.3	554

Continued…

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	15-24		25-34		35-44		Total	
	(n=132)		(n=286)		(n=217)		(n=635)	
	%	N	%	N	%	N	%	N
Ideal number of children								
0	0.0	-	0.0	-	1.4	3	0.5	3
1	9.9	13	13.7	39	7.0	15	10.6	68
2	80.9	107	71.1	204	56.2	122	68.0	432
3	9.3	12	12.5	36	23.3	51	15.5	99
4-5	0.0	-	1.9	6	11.5	25	4.8	31
Non-numeric response	0.0	-	0.7	2	0.5	1	0.5	3
Type of contraception currently used								
Not using	26.3	35	12.2	35	8.0	17	13.7	87
LARC/permanent method	7.0	9	2.6	7	1.3	3	3.1	19
Short-term modern method	3.1	4	1.8	5	1.6	4	2.0	13
Traditional method	63.6	84	83.4	239	89.1	193	81.2	516
	(n=132)		(n=286)		(n=214)		(n=633)	
Unmet need among currently married women								
No need	12.2	16	4.8	14	2.9	6	5.7	36
Unmet need	14.0	19	7.4	21	4.2	9	7.7	49
Met need	73.7	97	87.8	251	92.9	199	86.6	548