

## Appendix A: Methodology

This study provides comprehensive demographic estimates of the size and distribution of eight major religious groups in the 232 countries and territories for which the United Nations Population Division provides general population estimates as of 2010.<sup>16</sup> It includes estimates for Christians, Muslims, the religiously unaffiliated, Hindus, Buddhists, folk religionists, adherents of other religions and Jews. This study also provides estimates for the median ages of these religious groups at the regional and global level.

This appendix describes various stages of the work that led to this study. First, it describes the data and procedures used to derive estimates of the overall religious composition of each country. Second, it describes the procedures used to estimate religious composition in each country by age and sex (e.g., males between the ages 0-4, or females ages 95+). (This data was needed to help calculate the median ages of the religious groups.) Third, this appendix describes how additional data on fertility, migration and religious switching were collected. (This information was used to project the religious composition of countries to 2010 when the primary data on religious composition for a country was collected prior to 2008.) The appendix ends with a discussion about measuring religion in China, notes about estimates that vary from previously published Pew Forum reports and a list of the countries included within each of the six regions used in this report.

### General Procedures for Composition Estimates

#### Data Collection and Documentation

Pew Forum researchers acquired and analyzed religious composition information from about 2,500 data sources, including censuses, demographic surveys, general population surveys and other studies – the largest project of its kind to date. Censuses were the primary source for Pew Forum religious composition estimates in 90 countries, which together cover 45% of all people in the world.<sup>17</sup> Large-scale demographic surveys were the primary sources for an additional 43 countries, representing 12% of the global population. General population surveys were the primary source of data for an additional 42 countries, representing 37% of the global

<sup>16</sup> Population sizes in this study are based on the U.N.'s 2010 population estimate for each country and territory. The U.N. provided special estimates for Sudan and the new nation of South Sudan. The population estimate for Kosovo is based on the figure from the World Religion Database, which is deducted from the U.N.'s Serbia estimate.

<sup>17</sup> Census data were among the sources considered for many other countries. For example, Pew Forum researchers studied 2001 census round data in Canada and in the United Kingdom, but they ultimately relied on more recent demographic surveys collected by the census agencies in each country. This enabled the researchers to capture substantial changes in religious populations since 2001. In some countries that collect ethnic group data but not religion data on their census, the census was an important secondary resource. For example, in Russia and China, certain ethnic populations are predominantly Muslim, so the size of these groups is a useful indicator of the size of the Muslim population in each country.

population. Together, censuses or surveys provided estimates for 175 countries representing 95% of the world's population. In the remaining 57 countries, representing 5% of the world's population, the primary sources for the religious-composition estimates include population registers and institutional membership statistics reported in the World Religion Database and other sources. A list of the primary sources used to estimate the overall religious composition of each country is provided in Appendix B.

Censuses and nationally representative surveys can provide valid and reliable measures of religious landscapes when they are conducted following the best practices of social science research. Valid measurement in censuses and surveys also requires that respondents are free to provide information without fear of negative governmental or social consequences. However, variation in methods among censuses and surveys (including sampling, question wording, response categories and period of data collection) can lead to variation in results. Social, cultural or political factors also may affect how answers to census and survey questions are provided and recorded.

### Standardization of Religious Categories and Measurement Strategies

At least three researchers worked together to produce each country's religious composition estimates, observing the general procedures and considerations described below.

Pew Forum researchers standardized religion categories in all available censuses and surveys for each country. Censuses and surveys collect religious identity at different levels of specificity. For example, depending on the source, the most specific level of affiliation measured could be Christian, Protestant, Baptist or Southern Baptist. Researchers coded religious identities into standard categories that aggregate into the eight major religious categories used in this report.

The measure of religious identity in this study is sociological rather than theological. In order to have statistics that are comparable across countries, the study attempts to count individuals who self-identify with each religion. This includes people who hold beliefs that may be viewed as unorthodox or heretical by others who claim the same religion. It also includes people who do not regularly practice the behaviors prescribed by their religion, such as those who seldom pray or attend worship services.

### Identifying Primary Source(s) for Religious Composition Estimates

After considering all evidence available, researchers identified one or more primary sources for each religious composition estimate. Researchers sought a recent, reliable source – ideally, a census or large-scale demographic survey. Researchers favored sources in which religion was

measured with a single question that permitted respondents to identify specific affiliations or no affiliation at all.<sup>18</sup>

Nationally representative surveys were occasionally chosen as a primary source rather than a census or demographic survey due to limitations in the measurement of religion in the latter sources. In Vietnam, for example, the 2009 census and the 2005 Demographic and Health Survey did not adequately measure folk religion identities. Researchers instead relied on the 2005 Asian Barometer survey, which measured a wider range of religious identities, including identification with folk religions.

### Making Adjustments for Groups Not Adequately Measured

As necessary, researchers made adjustments to the primary source(s) to account for omitted or underrepresented groups since small minority groups are sometimes not measured or not reported in surveys and censuses. Multiple survey sources, denomination counts and estimates produced by country experts for each nation were used to assess whether minority religious groups were omitted or undercounted in the selected primary source(s).

In cases where censuses and surveys lacked sufficient detail on minority groups, the estimates also drew on estimates provided by the World Religion Database, which takes into account other sources of information on religious affiliation, including statistical reports from religious groups themselves.

### Adjusting for Limitations in a Survey Questionnaire

Usually, researchers assumed that members of underrepresented groups were included in the sample but were not adequately measured by the survey instrument. Adjustments frequently were made among people who responded “other religion” or failed to answer the religion question. In a few cases, the study made adjustments based on evidence that political, legal, or cultural dynamics in a country compromised the validity of self-reported religious identity.

In India, for instance, there is evidence of a Christian undercount in the 2001 census; some Christians who belong to Scheduled Castes (historically referred to as Untouchables or Dalits) choose to identify as Hindu when completing official forms such as the census.<sup>19</sup> This is due to a mandate in the Indian constitution that specifies that only Hindus, Sikhs and Buddhists can

18 The wording of religious identity questions varies across censuses and surveys, but the ideal measure is a direct one-step question, such as “What is your religion?” In contrast, many European surveys use a two-step question, such as, “Are you religious? If yes, what is your religion?” Two-step questions do not correspond well with census religion questions, which are usually one-step, direct measures. Furthermore, in many countries two-step questions seem to filter out many respondents who might otherwise claim a religious identity but who do not consider themselves as having a significant level of religious commitment.

19 This phenomenon is discussed in Kumar M, Ashok and Rowena Robinson. 2010. “Legally Hindu: Dalit Lutheran Christians of Coastal Andhra Pradesh” in “Margins of Faith: Dalit and Tribal Christianity in India,” edited by Rowena Robinson and Joseph Marianus Kujur. Sage Publications.

receive caste-based government affirmative-action benefits (known as reservations in India).<sup>20</sup> After analyzing Indian survey data and convening a special consultation on this topic with leading India demographers at the 2010 Asian Population Association's meeting in New Delhi, Pew Forum researchers adjusted the Christian population of India's 2001 population from 2.3% to 2.6%, assuming a 10% undercount in the census. In this case, the adjustment comes from the Hindu category. (Hinduism is the most common religion in India.)

### Adjusting for Sampling Limitations

In some situations, underrepresented groups are likely to be omitted from the sample itself. For example, recent migrants who may not be fluent in the language used in a survey are often missing in samples. Accounting for groups not included in the sample requires proportionately deflating survey data to account for underrepresented populations. For example, researchers made adjustments to survey-based estimates in Europe where they found evidence that some survey samples and population registers underrepresented Muslim migrants.

In this study, researchers sought to ensure that primary sources were representative of the entire country. When this was not the case, it was usually due to concerns about the safety of interviewers and census takers or disputes about political boundaries. In such cases, researchers attempted to make appropriate adjustments or find an alternative data source that was nationally representative.

For example, the 2001 Sri Lankan census was not conducted in a handful of northern and eastern districts because of perilous conditions due to armed conflict. After analyzing religion data from earlier censuses, Pew Forum researchers determined that the areas that were not covered by the 2001 census historically had a different makeup than the rest of the country. Pew Forum researchers adjusted the 2001 census data for Sri Lanka based on 1981 census data about regions omitted in the 2001 census.<sup>21</sup>

Religious identity is sometimes linked to ethnic identity, particularly for religious minorities. In a small number of countries where the census did not measure religious affiliation or where survey data on religious affiliation had sampling limitations, researchers used ethnicity data to estimate the religious affiliation of small groups. For example, ethnicity data from the 2002 Russian census was used together with 2005 Generations and Gender Survey data to estimate the proportion of Muslims in Russia. The survey did not adequately sample the country's predominantly Muslim areas but it did provide information on the share of Muslims within ethnic

20 Ministry of Social Justice and Empowerment, Government of India. <http://socialjustice.nic.in/faqs1.php#sc4>

21 There was no census in Sri Lanka in 1991.

groups associated with Islam.<sup>22</sup> This information, combined with census ethnicity data, was used to adjust the Muslim composition estimate in regions the survey sampled inadequately.

### Making Adjustments for the Religious Affiliation of Infants

Parents are sometimes hesitant to report a religious affiliation for their infant children even though they will claim a religion for the child when he or she is slightly older. Forum researchers observed evidence of this phenomenon in some Christian-majority countries where Christian parents were disproportionately describing their infants as religiously unaffiliated.

This is evident when comparing census numbers over multiple years. In Brazil, for example, the 2000 census reported that 11% of those ages 0-4 were unaffiliated. By the time of the 2010 census, only 8% of the same birth cohort (who were then 10 to 14 years old) was unaffiliated. While some of this change may be explained by mortality and migration, it is at least partly due to parents being more willing to describe their older children as Christians.

In order to compensate for this measurement bias in Brazil and a few other countries where there was considerable evidence of this phenomenon, Pew Forum researchers applied the religious composition of older children (those 5-9 years old) to infants and young children (those 0-4 years old). This adjustment was made only where there was a substantial difference between the religious composition of the youngest age group and children ages 5-9. (For countries in which this adjustment was made, there is a corresponding note in the list of sources by country in Appendix B.)

### Making Adjustments for Missing Religion Data

Some degree of missing data is found in most surveys and censuses. Census agencies typically make adjustments for missing data before reporting results. For example, though some respondents fail to answer questions about sex and age, census agencies follow procedures to impute missing values so it is not necessary to report “sex not stated” and “age not stated” as sex and age categories. Some census agencies, such as Statistics Canada, have historically imputed religion values for respondents who have not answered the census religion question.

The likelihood that religion data will be missing increases when religion questions are labeled as optional, as is the case in censuses in countries such as Australia, the United Kingdom and the Czech Republic.<sup>23</sup> Census agencies in countries where religion is labeled as an optional question often report “religion not stated” results alongside standard categories of affiliation and non-

22 Ethnicities with close links to Muslim identity include Tatars, Bashkirs, Chechens, Avars, Azeris, Kazakhs, Kabardian, Ossetians, Dargins, Kumyks, Ingush, Lezgins, Karachays, Adyghe, Balkar and Circassian.

23 The religion question became optional in the 2011 Czech Republic census. In that census, nearly half (45%) of Czech respondents did not state their religion. In other cases, non-response rates were more modest. For example, religion was not stated for about 8% of respondents in the 2011 Australian census.

affiliation. This strategy allows the census agencies to demonstrate that answering their religion question was indeed optional. However, for purposes of this study, the “religion not stated” category is not a meaningful religious identity. Therefore, after making any necessary adjustments for undercounted groups, religious shares were re-calculated based on the population of all people who gave valid responses to the census or survey. The effect of this approach was to proportionately raise the shares of all religious groups, including the religiously unaffiliated.

Following the procedures described above, researchers produced national-level estimates of the religious composition of each country for the year measured by the primary source. In order to report 2010 population figures, the religious composition percentages based on data collected in 2008 or later have been multiplied by the U.N.’s 2010 population estimate for each country and territory.<sup>24</sup> Estimates based on data collected prior to 2008 have been projected forward to 2010. These projections required additional information, including the religious composition of age and sex groups within each country.

Researchers from the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria, collaborated with Pew Forum researchers on data collection and religious composition estimates for Europe; Pew Forum researchers gathered data outside Europe. IIASA researchers also collaborated on development of the procedures described below, which were used to standardize information across countries for age breakdowns, childbearing patterns, migration flows and religious switching patterns. Researchers from the Vienna Institute of Demography provided initial estimates of country-to-country migrant flows by age and sex.

## Age Structure Procedures

Religious affiliation varies by age.<sup>25</sup> In this section, the phrase “age structure” is used as shorthand to refer to the religious composition of age-sex groups. In order to calculate the median ages of religious groups and carry out population projections, Pew Forum researchers assembled age structures for each of the eight religious groups in every country. Data on age structures were collected in 20 age categories (measured in five-year increments with a top value of 95 and above) for males and females (e.g. males between the ages of 15 and 19), resulting in a total of 40 categories.

Age structures were compiled in three steps. First, census or survey data were used to capture the religious affiliation of each available age group. Second, survey data on religion by age

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<sup>24</sup> Some data sources report figures for 2011. The religious distributions from these sources have also been applied to the U.N.’s 2010 population estimates.

<sup>25</sup> The religious affiliation of young people often differs from the affiliation of the older population due to religious switching, migration and variation in childbearing patterns by religion.

were adjusted to account for small sample sizes. And third, results were adjusted to match the religious breakdown by age and sex to each country's overall religious composition. These steps are described in detail below.

## Estimating Religion by Age and Sex

Pew Forum researchers constructed initial age structures by analyzing survey datasets, census datasets and tables published by census agencies. While censuses usually enumerate religion for the entire population, including children, general population surveys do not usually include interviews with children. Since age structures require religious affiliation data for children, children were assigned religious affiliations when necessary based on the best methods available. For datasets that measured religious affiliation only for adult respondents, yet included the number and ages of children (and other adults) in the household, researchers were able to estimate the religious affiliation of remaining household members. In most cases, the religious affiliation of the respondent or head of the household was assigned to all additional members of the household who were not surveyed.<sup>26</sup> For surveys that did not offer household information, such as the AmericasBarometer or the European Values Study, children were assigned a religious affiliation based on the fertility patterns and religious affiliation of women of child-bearing age, as well as information about the religious affiliation of the youngest respondents measured in the survey.

For many countries, reliable age data were not available for all eight religious groups. Sometimes a survey indicated the overall size of a small religious group yet lacked sufficient numbers to reliably estimate the group's age breakdown. In such cases, the age breakdowns of minority religious groups were based on the country's overall age distribution or the combined age distribution of respondents from all minority religions in a survey.

## Adjustments to Minimize Errors Due to Sample Size

The reliability of survey estimates is partly dependent on the number of people surveyed (the sample size). Since respondents who identify with religious groups are divided into 40 age and sex categories, the number of Muslims, for example, in any one age-sex category may be small and produce less reliable estimates than a larger count would produce. This introduces significant variation in patterns of religious affiliation by age: affiliation levels may bounce be-

26 Some demographic surveys, such as the Demographic and Health Surveys, ask the religious affiliation question only to members of the household who are in their reproductive years (usually between 15 and 49 years of age for women). Procedures used to assign religious affiliations to individuals in the Demographic and Health Surveys were validated against census data that enumerated all individuals in the country. Results of this validation exercise from Brazil, Ghana and Mozambique – countries that had both census data and data from Demographic and Health Surveys were presented at the 2011 annual meeting of the Population Association of America (Andrew Gully and Noble Kuriakose. "Can DHS Household Files be Used to Provide an Accurate Estimate of the Market Share and Age Structure of Large Religious Groups?").

tween highs and lows for consecutive age groups. To eliminate unlikely variation, researchers smoothed data using statistical procedures intended to reveal the general underlying pattern.<sup>27</sup>

Census data are not smoothed because census data represent a complete enumeration of all individuals living in a country. However, in some cases, the age categories reported by census agencies are in 10-year age groups or aggregated for all adults above a certain age, such as 60. Researchers used statistical modeling techniques to distribute the composition of these aggregated age groups across the more specific five-year age categories used in this study.

### Matching Religion by Age and Sex to Overall Population by Age and Sex

The overall religious affiliation resulting from the age structure procedures sometimes varies from the religious composition estimated for the country using the procedures described in the first section of this appendix. This difference exists for two reasons. First, the data sources used for the age-structure procedure may be different from the data sources used for the religious composition. Second, overall religious compositions were adjusted manually to account for undercounts and sampling issues.

In order to match the overall religious composition figures to the data on religion by age and sex, the age structure was adjusted. The adjustment procedure used is often referred to as Iterative Proportional Fitting (IPF), or raking. Raking makes adjustments to the percentages of religious affiliation for each age group without significantly altering the underlying religious affiliation patterns by age group. Additionally, raking is used to match each country's counts of males and females in particular age groups to the U.N.'s estimate of the country's overall age distribution.

When survey or census data on the differential religious composition of age-sex groups was not available, each age-sex group was assigned the same religious composition. Lack of differential religious composition data by age-sex group was most common in countries with very small populations.

### Sources for Age Structure Data

As mentioned above, the data source used for the country's age structure is sometimes different from the source used for the overall religious composition (see Appendix B for a list of religious-composition sources by country).<sup>28</sup> This is the case, for example, when census data with overall religious composition results are available but a detailed breakdown by age and

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<sup>27</sup> Most smoothing methods rely on using multiple points on the x-axis that are below and above the current point (in this case, points refer to religious shares within age groups) to produce a new value. For example, the religious affiliation shares of those ages 80-84 and 90-94 were taken into account in order to smooth the affiliation shares of those ages 85-89.

<sup>28</sup> Forthcoming Pew Forum reports will provide country-by-country bibliographic information for sources used to construct age structures.



sex is not released by the census bureau; another source must therefore be used to generate the age structure. Sources are also different when multiple waves of a survey series have to be combined in order to have a sample size large enough to construct reliable age structures.

Age structures were further adjusted in countries where the age structure data source is much older than the source used for the religious composition of the country. In order to harmonize the data on overall religious affiliation with the age structure, the age structure data is aged in five-year projections while holding the religious composition constant.

In a small number of countries, age structures were estimated based in part on ethnicity or citizenship data. For example, all six Gulf Cooperation Council (GCC) countries release information on the age distribution of citizens and non-citizens, but only Bahrain further breaks this information down by Muslims and non-Muslims.<sup>29</sup> For this reason, age-distribution estimates for citizens and non-citizens in other GCC countries are modeled on Bahrain, where almost all citizens are Muslim but a substantial share of the non-citizen population is non-Muslim due to the influx of migrant workers.

## Projecting Populations to 2010

For many countries, Pew Forum researchers drew on data collected in or around 2010. In some cases, however, religious affiliation data were collected in or around the years 2000 or 2005. In those cases, researchers used additional data on differential fertility, age structures and migration to project populations forward to 2010. This is the first time that formal demographic projections have been used to standardize multi-national religious population data collected in different years. This is also the first project to collect and incorporate data on the size, sex composition and religious composition of migrant flows in global population projections.

Since people can also move between religious groups within a given country, religious switching was also taken into account for some countries.

Below is a description of the projection approach, as well as the procedures used to estimate differential fertility rates, the flow of religious migrants between countries and patterns of religious switching.

### The Projection Approach

The projections in this report were made by researchers in the Age and Cohort Change Project of the International Institute for Applied Systems Analysis using an advanced variation of the

<sup>29</sup> The six Gulf Cooperation Council countries are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

standard demographic method of making population projections. The standard approach is called the cohort-component method, and it takes the age and sex structure of a population into account when projecting the population forward in time. This has the advantage of recognizing that an initial baseline population can be relatively “young,” with a high proportion of people in younger age groups (such as Nigeria) or relatively “old,” with a high proportion of older people (such as Japan).

Cohorts are groups of people that had an experience in a particular time. A birth cohort, the type of cohort referenced in this context, comprises people born in a certain period. Birth cohorts can also be described as males or females (or males and females) who have reached a certain age in a particular year. For example, the cohorts of females ages 15-19 in the year 2000 and males ages 15-19 in the year 2000 shared the experience of being born between 1981 and 1985.

Components are the three ways in which populations grow or shrink: new entrants via births, exits via deaths and net changes from migration. Each cohort of the population is projected into the future by adding likely gains – births and people moving into the country (immigrants) – and subtracting likely losses – deaths and people moving out (emigrants) – year-by-year. The very youngest cohorts, those ages 0-4, are created by applying age-specific fertility rates to each female cohort in the childbearing years (ages 15-49).<sup>30</sup>

The cohort-component method has been in existence for more than a century. First suggested by the English economist Edwin Cannan in 1895, then further improved by demographers in the 1930s and '40s, it has been widely adopted since World War II. It is used by the United Nations Population Division, the U.S. Census Bureau, other national statistical offices and numerous academic and research institutions.

The advanced variant of this approach, multistate cohort component projection, was developed at IIASA by the American geographer Andrei Rogers in the 1970s. The multistate approach permits simultaneous projection of the eight religious groups in this study, taking into account variation by religion in age, sex, childbearing patterns, and propensity and direction of migration. This approach also enables modeling of religious switching as a transition between religious “states.”

The country-by-country source list in Appendix B acknowledges when the religious composition of a country has been projected. Projections have been carried out for all countries with populations greater than 100,000 for which the primary source data used for composition estimates were collected prior to 2008. For countries with populations below 100,000, and in

30 The number of children age 0-4 projected to join a population is also influenced by infant and child mortality rates and migration rates incorporated in the projection model.

larger countries with data collected from 2008 or afterward, the population shares estimated for the year of the primary source have been applied to the country's population as of 2010.

### Estimating Fertility

In many countries, there are substantial differences in the number of children born to women across religions. Furthermore, religious groups often vary in the share of women in their population who are of childbearing age. Differences in childbearing and age-structure patterns combine to produce differences in the rates at which babies are born to adult members across religions.<sup>31</sup>

Fertility data was gathered from censuses and surveys, and fertility rates were estimated via direct and indirect measures. Some censuses and surveys directly measure recent births or the count of children a woman has ever given birth to by the time of the survey. In other cases, fertility data were gathered indirectly, for example, by using data on the age of a mother's children to estimate her past birth patterns. These various sources of fertility data were used to estimate age specific and total fertility rates for religious groups in each country.<sup>32</sup>

In many countries, data on differential fertility is available for the largest religious groups but sufficient detail is not available for all minority religious groups. In Nigeria, for example, more than 98% of women of reproductive age are either Christian or Muslim, and there is sufficient data for estimating fertility for these two groups. For other groups in Nigeria, however, researchers had to base estimates on more limited data. Similarly, there are many countries in which one religious group makes up 95% or more of the women of reproductive age, resulting in a relatively small number of women of other religions providing fertility data.

In some countries, differential fertility data by religion were not available. In these cases, researchers applied prevailing national fertility rates to all religious groups equally.

### Estimating the Size and Religious Composition of Migrant Flows

Accounting for migration in religious-group projections is important because migration can significantly change the religious landscape of countries. For example, the movement of Turkish and North African Muslims to Europe during the past decade has steadily increased the Muslim population in most Western European countries. Similarly, the movements of Hindus from India and Christians from the Philippines to Gulf Cooperation Council countries are making these Muslim-majority countries less Muslim. To accurately estimate the impact of these changes, projections require input data on migrant flows between countries by religion.

31 Results from the analysis of fertility differences by religion will be presented in a future Pew Forum report that will project the future growth of major religious groups. In this report, information on differential fertility is used in projections to the year 2010.

32 The total fertility rate (TFR) is the total number of children an average woman would have in her lifetime if fertility patterns did not change. The TFR is calculated by adding the birth rates among women in each age group in a particular country during a given period; in other words, it is a kind of snapshot of fertility patterns at one place and time.

Data describing the size and religious composition of migrant flows were pieced together in two steps. The first step was to estimate the size of migrant flows for males and females to and from every country in the world since the year 2000. This was carried out using immigrant stock data from the World Bank and the Pew Forum's Global Religion and Migration Database.<sup>33</sup> The plausibility of this data was checked against U.N. net migration estimates and available flow data from countries. Slight adjustments were made to flow estimates where underlying data were less reliable.

The second step was to identify the religious composition of migrants moving from one country to another. Sometimes researchers assumed migrants leaving a country had the religious composition of the country they were leaving. However, in many cases researchers had evidence to challenge this assumption. Specifically, religious minorities in a sending country may be disproportionately likely to migrate to a country in which their religion is in the majority. For example, in the Middle East, Christians are more likely than Muslims to move to the United States. The Pew Forum's Global Religion and Migration Database captures such dynamics for many of the world's large migrant pathways. It was therefore used to improve estimates of the religious breakdown of large migrant flows between a series of key countries.<sup>34</sup>

Researchers have identified general age and sex patterns of cross-national migration. Using empirical data and research-based observations about the age and sex structures of migrant flows, researchers were able to model flows of migrants by five year age-sex cohorts and religion.

### Estimating Religious Switching

In many advanced industrial countries, religious switching is producing substantial changes in the religious landscape. While there is evidence of many different types of religious switching, in many countries one of the profound shifts is a net movement toward being religiously unaffiliated. In a few of the countries that were projected to 2010 for this report (specifically, Austria, Germany and Italy), there was evidence that substantial religious switching was occurring and data were available to model switching in the population projections.

The input data for the analysis of religious switching in this report is a comparison of reports of religious origins and current religion for adults ages 30-54 in recent general population surveys. By comparing reports of respondents' childhood and current religion, researchers estimated transition rates between all religious groups. These switching rates were calculated

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33 A detailed methodology for estimating global flows can be found at Abel, Guy J. 2012. "Estimating Global Migration Flow Tables Using Place of Birth Data." Vienna Institute of Demography. [http://www.oeaw.ac.at/vid/download/WP2012\\_01.pdf](http://www.oeaw.ac.at/vid/download/WP2012_01.pdf).

34 A detailed methodology for the Pew Forum's Global Religion and Migration Database and sources can be found at <http://www.pewforum.org/faith-on-the-move.aspx>.

separately for males and females. The overall rate of religious change was then applied to cohorts ages 15-29 in population projections. For projection purposes, each person was allowed one switch, which is all that is directly measured in the surveys this method draws upon.

Religious switching results and elaboration of this approach will be described in greater detail in future Pew Forum reports.

## Other Topics

### China

For most countries, estimates for the size of the eight religious groups are based on one or two primary sources. In China, however, they come from several sources because, as described in detail in a previous Pew Forum demographic study, data on religion in China are deficient.<sup>35</sup> The following description summarizes the various sources used to estimate the size of each religious group in China.

*Muslims.* Most Chinese Muslims belong to one of several ethnic groups that are overwhelmingly Muslim. The 2000 Chinese census included a measure on ethnicity. While not all members of these ethnic groups would necessarily identify as Muslim, the census figures provide a reasonable and generally accepted approximation of the size of China's Muslim population.

*Christians.* Because there is some evidence that on public opinion surveys Christians may underreport their religious identity, the Pew Forum reviewed multiple sources to arrive at an approximation of the size of China's Christian population. For details, see Appendix C: Methodology for China, in the Pew Forum's December 2011 report "Global Christianity."

*Hindus and Jews.* Members of these two religious groups are predominantly expatriates and are relatively few in number.<sup>36</sup> The Pew Forum's estimates for Hindus and Jews in China rely primarily on the World Religion Database.

*Buddhists, other world religions, folk religionists and the religiously unaffiliated.* Estimates for these four religious groups are based on an analysis by Pew Forum staff of the 2007 Spiritual Life

<sup>35</sup> For a discussion of data challenges in China, see Appendix C: Methodology for China, in the Pew Forum's 2011 report, "Global Christianity: A Report on the Size and Distribution of the World's Christian Population."

<sup>36</sup> See Leslie, Donald. 1972. "The Survival of the Chinese Jews: The Jewish Community of Kaifeng." Brill.

Study of Chinese Residents.<sup>37</sup> Estimates of the size of the Buddhist population and the number of members of other world religions – the largest being Taoism – come directly from the survey.<sup>38</sup>

*Folk religion.* The 2007 Spiritual Life Study of Chinese Residents did not offer respondents the same opportunity to choose folk religion as a religious category as it did to choose the five religions officially recognized by the Chinese government – Buddhism, Catholicism, Daoism, Islam and Protestantism.<sup>39</sup> Therefore, the estimate of folk religionists needed to be computed by considering the beliefs and practices reported by the survey participants. This study’s estimate of the share of the Chinese population affiliated with folk religion (22%) is based on conservative criteria that focused primarily on worshiping or believing in gods or spirits associated with Chinese folk religion.<sup>40</sup> If a broader range of beliefs and practices, such as fengshui practices, were included in the criteria, the estimate would be higher. Other estimates range from 30% by the World Religion Database to 55% by scholars Fenggang Yang and Anning Hu.<sup>41</sup>

*Religiously unaffiliated.* The unaffiliated are all who do not identify with one of the other religions.

## Differences Between Current Estimates and Previous Pew Forum Estimates

In a small number of countries, estimates of the size of Muslim and Christian populations reported in this study are more than 10 percentage points different from Pew Forum estimates previously published in “The Future of the Global Muslim Population” and “Global Christianity: A Report on the Size and Distribution of the World’s Christian Population.”

Differences reflect the availability of more recent or higher-quality data on religious affiliation. In Brunei, the Czech Republic and Kazakhstan, for example, newer census data became available. In the Gulf Cooperation Council countries, such as Bahrain, Kuwait and Qatar, Pew

37 The 2007 Spiritual Life Study of Chinese Residents (data archived at the Association of Religion Data Archives, <http://www.thearda.com/Archive/Files/Descriptions/SPRTCHNA.asp>) was a multi-stage random survey of mainland China administered in three municipalities (Beijing, Shanghai and Chongqing), six provincial capitals (Guangzhou, Nanjing, Wuhan, Hefei, Xi’an and Chengdu), 11 regional cities, 16 small towns and 20 administrative villages. No major cities in the west, the far northeast or on the south-central coast were surveyed. The study was conducted with face-to-face interviews of 7,021 Chinese adults ages 16 and older and had an American Association of Public Opinion Researchers response rate of 28.1%.

38 The 2010 Chinese General Social Survey conducted by Renmin University reportedly included a battery of questions on religion. The data for that survey were not publically available at the time of this analysis.

39 Scholars inside and outside of China clearly recognize Chinese folk religion as an important category. For instance, the authors of the “Blue Book of Religions” (2010), a publication of the Chinese Academy of Social Sciences, argue that folk beliefs constitute a part of Chinese religious culture that should be held in the same regard as the five officially recognized religions – Buddhism, Catholicism, Daoism, Islam and Protestantism. See Chinese Academy of Social Sciences. 2010. “Blue Book on Religions.” Pages 170-171 and 175. The Chinese Academy of Social Sciences, the highest academic research organization in the fields of philosophy and social sciences, is directly under the State Council of the People’s Republic of China – the highest executive organ of state power as well as the highest organ of state administration. For a fuller discussion of Chinese folk religions, see Yang, Fenggang and Hu, Anning. 2012. “Mapping Chinese Folk Religion in Mainland China and Taiwan.” *Journal for the Scientific Study of Religion*, volume 51, number 3, pages 505-521; Wong, Wai Yip. 2007. “Defining Chinese Folk Religion: A Methodological Interpretation.” *Asian Philosophy*, volume 21; Li, Y. Y. 1998. “Zong Jiao Yu Shen Hua Lun Ji [A Treatise on Religion and Myth].” New Century Publishing; and Feng, Z. Z. and Li, F. H. 1994. “History of Chinese Folk Religion.” Wenchin.

40 Respondents from the 2007 Spiritual Life Study of Chinese Residents survey were classified as a folk religionist if they did not identify with one of the other religious groups and they did report that they worshiped gods or spirits at conventional religious sites, at home or in the workplace; or if they attended formal temple services or prayed or burned incense in temples; or if they believed in the existence of gods or spirits, evil forces or demons, heaven, hell, the afterlife or reincarnation.

41 Yang, Fenggang and Hu, Anning. 2012. “Mapping Chinese Folk Religion in Mainland China and Taiwan.” *Journal for the Scientific Study of Religion*, volume 51, number 3, pages 505-521.

Forum researchers adjusted earlier estimates to reflect the religious affiliation of large migrant populations. Data on the size and religious affiliation of migrant populations were gathered as part of a Forum project on international migration.<sup>42</sup>

While the Pew Forum's 2011 report "The Future of the Global Muslim Population" found that India had the third-largest Muslim population, after Indonesia and Pakistan, this report finds that India has the second-largest Muslim population. That report used country population For more information, see the Pew Forum's March 2012 report "Faith on the Move: The Religious Affiliation of International Migrants." estimates from the 2008 revision of the United Nation's World Population Prospects, which estimated Pakistan's total 2010 population to be 184.8 million. This report relies on the 2010 revision of World Population Prospects data, in which Pakistan's total 2010 population is estimated to be 173.6 million. In addition to lowering its estimate for Pakistan, the U.N. Population Division also raised its estimate of India's total population between the 2008 and 2010 World Population Prospects. Meanwhile, the current round of Pakistan's population census has experienced many delays. Preliminary population estimates from Pakistan's 2011 housing census suggest the population could be substantially greater than estimated in the 2010 World Population Prospects data (197.4 million, according to a report in the Times of India: [http://articles.timesofindia.indiatimes.com/2012-03-29/pakistan/31253998\\_1\\_population-gilgit-baltistan-balochistan](http://articles.timesofindia.indiatimes.com/2012-03-29/pakistan/31253998_1_population-gilgit-baltistan-balochistan)). The reliability of the preliminary estimates has been publicly contested, but if the preliminary estimates are correct, then Pakistan's Muslim population may exceed India's Muslim population.<sup>43</sup>

In the Pew Forum's 2011 report "Global Christianity," the Americas was identified as the region with the largest Christian population. However, as described in the region note below, this report divides the Americas into two regions. While the combined regions would still have the largest Christian population in the world, with the six regions used in this report, Europe becomes the region with the largest Christian population.

## A Note on Regions

This report groups 232 countries and territories into six major regions: Asia and the Pacific, Europe, Latin America and the Caribbean, the Middle East and North Africa, North America and sub-Saharan Africa. Some previous Pew Forum reports including "Global Christianity: A Report on the Size and Distribution of the World's Christian Population" and "The Future of the Global Muslim Population" grouped the world into five regions, with an Americas region that included both North America and Latin America and the Caribbean.

<sup>42</sup> For more information, see the Pew Forum's March 2012 report "Faith on the Move: The Religious Affiliation of International Migrants."

<sup>43</sup> See Rana, Shahbaz. Jan. 11, 2012. "2011 Housing Census results: Over-counting in Sindh, undercounting in Punjab." The Express Tribune. <http://tribune.com.pk/story/319617/2011-housing-census-results-over-counting-in-sindh-undercounting-in-punjab/>.

The 60 countries and territories in the Asia and the Pacific region are: Afghanistan, American Samoa, Armenia, Australia, Azerbaijan, Bangladesh, Bhutan, Brunei, Burma (Myanmar), Cambodia, China, Cook Islands, Cyprus, Federated States of Micronesia, Fiji, French Polynesia, Guam, Hong Kong, India, Indonesia, Iran, Japan, Kazakhstan, Kiribati, Kyrgyzstan, Laos, Macau, Malaysia, Maldives, Marshall Islands, Mongolia, Nauru, Nepal, New Caledonia, New Zealand, Niue, North Korea, Northern Mariana Islands, Pakistan, Palau, Papua New Guinea, the Philippines, Samoa, Singapore, Solomon Islands, South Korea, Sri Lanka, Taiwan, Tajikistan, Thailand, Timor-Leste, Tokelau, Tonga, Turkey, Turkmenistan, Tuvalu, Uzbekistan, Vanuatu, Vietnam and Wallis and Futuna.

The 50 countries and territories in Europe are: Albania, Andorra, Austria, Belarus, Belgium, Bosnia-Herzegovina, Bulgaria, Channel Islands, Croatia, Czech Republic, Denmark, Estonia, Faeroe Islands, Finland, France, Georgia, Germany, Gibraltar, Greece, Hungary, Iceland, Ireland, Isle of Man, Italy, Kosovo, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Republic of Macedonia, Romania, Russia, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom and Vatican City.

The 46 countries and territories in Latin America and the Caribbean are: Anguilla, Antigua and Barbuda, Argentina, Aruba, Bahamas, Barbados, Belize, Bolivia, Brazil, British Virgin Islands, Cayman Islands, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Falkland Islands (Malvinas), French Guiana, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Montserrat, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Turks and Caicos Islands, U.S. Virgin Islands, Uruguay and Venezuela.

The 20 countries and territories of the Middle East and North Africa are: Algeria, Bahrain, Egypt, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, the Palestinian territories, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, United Arab Emirates, Western Sahara and Yemen.

The five countries and territories of North America are: Bermuda, Canada, Greenland, St. Pierre and Miquelon and the United States.

The 51 countries and territories of sub-Saharan Africa are: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea Bissau, Ivory Coast, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mayotte, Mozambique, Namibia, Niger, Nigeria, Republic of the Congo, Reunion, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, St. Helena, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe.



## A Note on Country and Territory Designation

The word “country” in this report refers to all countries recognized as such by the United Nations. The word “territory” in this report does not have a technical definition, but rather is a general term for distinct geographical entities not recognized as countries by the United Nations but that have separate population estimates reported by the United Nations. Territories in this report including such entities as Hong Kong and Macau (special administrative regions of China), Greenland (an autonomous constituent country within the Kingdom of Denmark) and the Commonwealth of Puerto Rico (an unincorporated territory of the United States).

## A Note on Rounding

In this report, estimates of 9,999 persons or less are identified as “<10,000.” All other count estimates in tables are rounded to the nearest 10,000. In the narrative of the report, many estimates are rounded to the nearest million or percentage point.