

Conducting a Survey in a Newly Developed Country*

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Research Overview and the Need to Conduct a Survey

During recent research in Mauritius, I explored how ethnic group boundaries are maintained through individual choices on whom to marry. A general consensus seems to have emerged in Mauritius, in both popular and academic circles, that intermarriage is on the rise (Benedict, 1961; Christopher, 1992; Eriksen, 1993; Mannick, 1979). A local reporter gained access to the civil status records for 1982-1987 and, relying on constitutional definitions of ethnic groups, reported that intermarriage had nearly doubled, from 4.69% to 8.83%, during the five-year period (Patel and Raumiya 1988).

Just how much intermarriage is increasing (if at all) and what constitutes an intermarriage remain unclear. The ethnic groups recognized by the Constitution of Mauritius do not reflect the diversity of ethnic identities held by the population of the country. Several public offices in Mauritius have census data that could be used to assess actual patterns of intermarriage, but all disaggregated forms of these data are, by law, confidential. I decided to run a survey to gather the information needed.

The Mauritian Context

Mauritius has all the conditions needed for survey work. The nation has a long history of government-mandated surveys and censuses and people readily respond to questionnaires. A growing private market research industry has acclimated Mauritians to responding to anonymous questionnaires but surveys are still not that frequent and continue to be novel and interesting. The country has an excellent infrastructure, including abundant telephone lines, a network of roads and public transportation, and rapid mail service. Still, designing and implementing a survey in Mauritius presented challenges.

Sampling

Sampling among ethnic groups is one of the challenges. The commonly demarcated ethnic groups, such as Hindus, Muslims, Chinese, and members of the "General Population" - - Creoles, and Franco-Mauritians -- may be more salient in political terms (Lau Thi Keng 1991) than in choice of spouse. The Muslims, for example, comprise several distinct groups including Sunnis, Shiites, Ahmadists, and Kutchi Maimoms. With so many labelled groups, stratifying to this level is impractical. Rather than try to ascertain which groups are endogamous, calculate their population, and collect a proportional quota sample, I decided to use a simple random sample.

Obtaining a random sample of the population was relatively easy, but locating these individuals proved to be daunting. The Electoral Commissioner maintains a list of the names

and addresses of all people over 18 in Mauritius. This list is updated every few years, most recently in 1993. Containing some 750,000 names, the list is broken up into several hundred booklets arranged into the nine electoral districts. The names within each booklet are numbered. Using ANTHROPAC 4.0 and later Excel 4.0, random numbers were generated between 1 and 8000 (the largest number in the largest book.) As the packets were of unequal size, the number taken were proportional to size, one name recorded for each 750 names located in a packet. Names and addresses were entered into a relational database. Mauritius had a population of approximately 1,071,000 in 1993 (Mauritius 1994). I wanted a sample of about 450 individuals. I anticipated a response rate of about 60% and calculated the rate of marriage for people over 20 years of age to be approximately 75%. I selected 1000 names for the sample to ensure that an adequate number of married individuals would reply to the survey and that I would wind up with the 450 needed. The sample size was selected to ensure that the population was represented. The list of Mauritians over 18 was already two years old when we did the survey, so it actually represented Mauritians over the age of 20. The Civil Status Office reports that for 1990, 5397 people under the age of 20 were married (see Table 1 for details). The vast majority of these individuals (96%) were woman.

	1983	1990
# married people < 20 (per 1000 of pop. <20)	14.7	13.7
# married people < 20 (per 1000 of total pop.)	6.4	5.3

Table 1. Only a small fraction of married individuals are under the age of 20 in Mauritius, 96% of which were women. Due to the small number of young married individuals, the sample, which ignores them, is probably still representative of the population as a whole.

Due to the great heterogeneity of the population, it is possible that these 5186 woman represent a significant proportion of a particular sector of the society. For example, while no community in Mauritius is particularly known for early marriages for women, arranged marriages for Muslim women may occur at a young age. On the other hand, all marriages under 20 years of age comprise just 1.1% of the total number of people who are civilly, religiously, or consensually married, widowed, divorced, or separated. Age of marriage is also increasing, so the proportion of marriages under 20 reported for 1990 will be an overestimate for 1995. One can safely conclude that the sampling frame accurately represents the married population.

While the sample size is adequate to assess the overall rate of intermarriage, assessing more specific patterns of intermarriage to statistically significant levels requires a much larger sample.

Language

In polylingual Mauritius, the survey could have been written in English, French, or Kreole¹. Each language has political connotations and practical implications. English is the vernacular of the educated elite. Kreole is the most commonly spoken language on the island, but its low status and irregular orthography make it a poor medium for a survey (Baker 1982). Almost all popular writings are French and even those who cannot speak good French often can read the language. The cover letter and questionnaire were prepared in French.

Mauritius has a relatively high literacy rate of 78% (Worldmark 1995), supporting the use of written questionnaires. The 78% official literacy rate may be an underestimate. A range of estimates of from 60%-90% literacy were reported during 1982 (Bunge 1982) Since then, the educational system has expanded rapidly. We were able to contact respondents who did not send in their questionnaires and many of those who were illiterate were interviewed face-to-face or by telephone. (In fact, I received phone calls from two illiterate respondents and took their data on the phone.)

Defining Intermarriage

The survey was designed to distinguish between marriages that cross socially demarcated ethnic lines (intercommunity) and marriages that only break endogamy rules (interethnic). Some marriages break rules of endogamy but remain invisible in the official statistics. For example if a Sunni Muslim marries an Ahmadiyya Muslim, this would be looked on as an interethnic marriage within the Sunni and Ahmadiyya communities but the marriage would be recorded as simply "Muslim" by the state. In contrast, a marriage between a Catholic Chinese and a Catholic Creole, in addition to breaking rules of endogamy, would be officially recorded and recognized as an intercommunity marriage. To complicate matters further, ethnic boundaries are fluctuating due to rapid social and cultural changes in Mauritius. This weakens consensus as to what constitutes an intermarriage. Traditional Hindus in Mauritius marry only within caste, but less traditional Hindus do not consider a marriage with another Hindu of different caste origin to be an interethnic marriage. Some Bhojpuri speakers would consider marrying a Marathi-speaking Hindu to be endogamous while marrying a Tamil or Telugu-speaking Hindu to be an interethnic marriage.

Since there are many ways to assess and measure intermarriage, questions were designed to solicit the fundamental variables upon which more complex social realities, such as ethnicity, are built. It was not possible to construct a survey of sufficient detail to measure

¹To avoid confusion Creole references to the ethnic group while Kreole refers to the language.

accurately all forms of intermarriage but the data do represent the minimum percentage of such marriages in the population. The content of the survey was kept simple, clear, and short.

Questionnaire Format

To ensure a high rate of return, an extremely simple and nonthreatening form was designed (Dillman 1978). The questionnaire was designed with PageMaker to fit on a single A4 sheet of paper and was folded to form a booklet with a cover on the front. The cover was printed in English to give the survey an official feel to it while grounding its purpose in education. University of California was printed on the cover in large point along with Marriage in Mauritius Research Survey. On the back of the booklet the return address was printed and a stamp was affixed. Thus the questionnaire itself was returned in the mail without needing an additional envelope (a large additional expense in Mauritius). As is general practice, no questions were cut off at the bottom of the page. A maximum of white space was used as well.

First Mailing

Mauritians seldom receive bulk mail and the mailing label has not become a symbol of impersonal, mechanized mass mailing. We were thus able to use mailing labels, which saves a lot of time. Many of the addresses -- such as "NAME, Camp Samy near the Mosque, Moka" -- appeared to be incomplete. We later discovered that these were indeed complete addresses and that the post office found almost all locations. As is the case in most mailed surveys, within a few days, the number of questionnaires being received reached a plateau followed by a rapid decline (Dillman 1983). A total of 219 questionnaires were returned from the first mailing.

Telephone Calls

Mauritius had 126,460 lines in 1993 (Mauritius 1994) and probably had about 176,000 in 1995. These lines serve businesses and the country's 237,000 households. Thus, telephone interviewing could not be the sole vehicle for contacting subjects, but, combined with the other techniques, the telephone helped us increase the rate of response.

We searched for each survey respondent in the 1995 telephone directory. This was a time-consuming but worthwhile task. Many people, particularly woman, were not listed in the directory. Rather the husband's (or sometimes the father's) name appeared. Consequently, many of our respondents' phone numbers were located by finding a match between the surnames and the addresses. Searching for the same address among the most common names was a tedious process. Sometimes, addresses were similar but not exactly the same, usually being the residence of a relative who lived nearby. In these cases, we called the relative in an attempt to track down the respondent.

In all, some 551 telephone numbers were identified. Of the 355² numbers actually called, many turned out to be incorrect. But the increase in the overall response rate made the exercise worthwhile. When permitted, the questionnaire was completed over the telephone. Telephone interviews were conducted by three Mauritian university students after a brief training session. All calls were conducted in Kreole and were monitored by the principal investigator. Data from a total of 86 telephone calls were included in the total pool of respondents.

Door-to-Door

A list was updated daily of all questionnaire respondents who had not yet returned the questionnaire by mail and who had not been reached by telephone. This list was subdivided into villages and towns, which were grouped, in turn, by geographic location. Mauritian university students were paired with volunteers from the University of California at Berkeley's University Research Expedition Program (UREP). Teams were deposited in sequences of villages along roads. Using a pager with text transmission, a van was able to locate and pick up teams as the teams moved from one village to another searching for respondents. In this way teams could rely on the van to cover long distances while taking buses and taxis to cover shorter distances. On any given day, between four and six teams worked in adjacent villages, moving from one village to another as they looked for respondents in the sample. Maps were provided and addresses were located on map quadrants. However these maps were often incomplete or noted only one of many names for a given street. The best maps were from the Police Headquarters Drawing Office but these maps contained no street indexes. We used informants who were very familiar with the mapped areas to locate the streets on the map. An index of streets where survey recipients lived was created and quadrants assigned. In the smaller villages, people knew each other by name and thus survey recipients were more easily located. In addition, in smaller villages, neighbors were often able to provide accurately the needed information while in large urban areas neighbors hardly knew each other by name.

When teams arrived at a vacant home extra surveys were left with a small note reminding the occupant of the importance of responding. Some addresses were found not to exist and the persons attached to those addresses were removed from the sample. Some people enter the address of their family on the electoral list in order to be able to vote in a district where they feel they have more influence. In these cases, family members receive the mail. A name was removed from the sample when the post office repeatedly returned the questionnaire with no forwarding address, and when the person could not be reached by telephone or in person.

²As the telephone survey was being conducted at the same time as face-to-face interviews, some individuals did not need to be called as their response had already been obtained. Telephone calls also proved to be the least cost-effective approach and was eliminated due to a lack of funds.

One respondent died before being interviewed. Over the course of the study, the sample dropped from 1000 to 930. A total of 210 face-to-face interviews were conducted.

The Survey Schemata

The use of American UREP volunteers also helped divorce the door-to-door interviews from the highly politically charged Mauritian social context. Americans are removed from the Mauritian social and political environment in ways that French, English, Australian, and South Africans are not. These later groups have close economic ties with Mauritius and consequently do not traverse the social landscape as easily as Americans, who are distant and idealized. Having an American appear at your door-step asking questions about your marriage ensured people that the information would not be used within the Mauritian political-economic realm. Indeed it was easy for the people to subsume the activity under the general concept of research, having been interviewed face-to-face for the census.

Only a handful of people, mostly Muslim woman, refused to be interviewed face-to-face. These woman feared participating without the permission of their husbands or fathers. In such instances the subject was left with an additional stamped questionnaire and asked to return it at their convenience.

Second Mailing

A second letter and questionnaire was mailed out approximately three weeks after the first. The face-to-face interviews had been completed while the telephone interviews continued. The same procedures were used as in the first mailing, except that a different form letter was included. The new letter urged the individual to participate in the study in order to ensure a representative sample. In Mauritius, survey results have serious political consequences as members of parliament are chosen in part based upon the proportion of each ethnic group in the population. By invoking concerns of proper representation, it was hoped to stimulate greater participation.

By this time, 450 respondents had been reached either by mail, telephone, or in-person, so a total of 550 second letters were mailed (we did not drop people from the sample until later). Letters returned by the post office were resent to ensure that the address was in fact incorrect. 124 questionnaires were obtained from the second mailing.

Tracing Respondents

To ensure the anonymity of respondents, we used two databases to keep track of who had responded. The first database contained the list of names and addresses of all members of the sample as compiled from the Electoral Commissioner's list. Each name was assigned an

identification number between 1-1000. When questionnaires were collated, the name on the form letter was matched to the corresponding ID number. Only this ID number was written on the questionnaire cover.

As questionnaires were returned, the ID numbers were used to check off those people who had responded. The same procedures were used in telephone and face-to-face interviews. Thus, during the second mailing, the research team knew who had not responded and, therefore, who needed to be sent a second letter.

The use of ID numbers did ensure that duplicate questionnaires were not input into the computer. However, the use of multiple techniques for gathering the data meant that sometimes a questionnaire was completed during a face-to-face interview after the spouse had mailed in a duplicate questionnaire a day earlier.

A separate database was used to maintain the responses of the survey. Again, the ID number was assigned. By cross-referencing the two databases, the identity of the respondent could be ascertained, but passwords were required to access this information. During the course of the survey, situations arose where the respondent needed to be identified. On a few occasions, two forms were retrieved with the same ID number but containing different information. Almost invariably, this occurred when the respondent was unmarried and gave the questionnaire to a married relative thinking that the form had been mailed to them in error. In these cases the respondent was contacted and asked to clarify which form contained the correct information.

Once the survey was completed, the file containing the names and addresses was simply deleted. This ensured the complete anonymity of respondents.

Discussion

Since Mauritian society is ethnically heterogeneous, a lot of cultural, and thus behavioral, variability is likely. The greater the variability, the larger the sample you need in order to precisely represent the overall patterns of behavior for the population. If you have a bowl of peanuts, then a small handful is all you need in order to describe characteristics like flavor, density, average mass, etc. If you take a small sample of party mix, however, the chances are good that you will miss some of the ingredients. Based on previous research in Mauritius, it was decided that the most effective way to increase the sample size was to use multiple survey vehicles -- that is, to collect data by mail, by phone, and in face-to-face interviews.

We chose to collect data in three different ways because each method elicited data from distinctive segments of the population. We knew that mailed questionnaires would be returned by more literate people. This method would oversample the educated population. Telephone

interviews were only possible with those wealthy enough to have access to a telephone, though the very wealthy tend to have unlisted numbers. Face-to-face interviews were the method of choice for rural residents, particularly older individuals, but some people are less comfortable with face-to-face interviews than they are with the anonymity of phone and mail surveys. Each instrument seemed to have a bias toward eliciting responses from a particular segment of the population. Using three different methods helps us triangulate to an unbiased sample.

Using telephone and face-to-face interviews increased the final number of respondents to 643 from 347 reached by mail alone.

The sample obtained seems to reflect some of the basic properties of the population, despite the use of multiple instruments to collect the data. Characteristics not directly related to marriage are compared between the population and the sample to see the extent to which the sample captures the general variation found in the population. The sample has both an age distribution and sex ratio close to that of the population as a whole, summarized in Table 2. The residential distribution of the population is compared to that of the sample in Table 3, while Table 4.0 compares the self-reported religious affiliation for both the population and the sample. Given these results, the sample seems to capture much of the variation of the population.

		Population >20 years		Sample	
		male (n=322,000)	female (n=325912)	male (n=560)	female (n=536)
Age	mean	38.9	40.2	43.3	39.9
	std dev	14.74	15.93	14.65	13.93
Sex Ratio		49.54%	50.46%	51.09%	48.91%
		1	1.02	1.04	1

Table 2.0: Age and sex ratio of population and sample. The differences in sex ratios between the population and the sample are also insignificant ($p=0.344$ for males and $p=0.242$ for females). Population statistics taken from the 1990 Housing and Population Census.

	n	% of sample (n=1000)	% of population (n=1,056,660)
Port Louis	97	9.7%	12.7%
Suburban	342	34.2%	37.9%
Urban	561	56.1%	49.4%

Table 3.0 Distribution of sample compared to that of the population as reported in the 1993 Annual Digest of Statistics (Mauritius 1994). Suburban areas were grouped as Vacoas, Phoenix, Quatre Bornes, Floreal, Beau Bassin, Rose Hill, Curepipe, and Moka, major towns. The census used electoral districts which include all these areas within the Plaines Wilhelms District, except for Moka. Here Moka has been included due to its proximity and density. Population statistics taken from the 1990 Housing and Population Census.

	% Population	% Sample		
	(n = 1,056,660)	Male (n=621)	Female (n=624)	Total (n=1245)
Hindu	30.5	42.5 (273)	38.4 (247)	41.8(520)
Roman Catholic	27.2	22.0 (142)	20.53 (132)	22.0 (274)
Muslim	16.2	13.22 (85)	12.75 (82)	13.4 (167)
Tamil	6.48	5.6 (36)	6.07 (39)	6.02 (75)
Telugu	2.70	2.49 (16)	2.18 (14)	2.41 (30)
Marathi	1.89	1.71 (11)	1.09 (7)	1.45 (18)
Buddhist	0.26	0.16 (1)	0.31 (2)	0.24 (3)
Not stated	0.08	8.86 (57)	15.71 (101)	12.7 (158)

Table 4.0: Self-reported religious affiliation of the population and sample. Population statistics taken from the 1990 Housing and Population Census.

Consistency of Subject Response to Questionnaire

A total of 707 forms were obtained for 643 people. Thus 64 forms were duplicates sent or collected on separate occasions³. Of these, 7 discrepancies were found out of a total of 1088 questions. (Each of the 64 questionnaires had 17 questions for a total of 1088 questions.) The rate of error on forms received in duplicate was relatively low, less than 1%. This may be used as a gauge with which to judge the data obtained from questionnaires not received in duplicate. Differences in handwriting suggest that duplicate forms were often mailed in by each spouse separately. The consistency with which questions were answered indicates that the questions were understood by the subjects.

Conclusions and Survey Results

Questionnaires were obtained from a total of 643 individuals out of an original sample of 1000, later reduced to 930. The breakdown of the survey returns are outlined in Table 5. A 69% rate was obtained by combining a number of separate survey strategies, alone none of

³Duplicates were not used to calculate response rates.

which would have performed adequately. This design increased the overall efficacy of the survey. In highly heterogeneous societies with developing infrastructures, where large sample sizes are required for significant representation, increasing the number of variables is an appropriate measure. While multiple survey procedures may cause inconsistencies in exposure and responses, the larger sample and higher response rate may increase the overall accuracy of the research.

Instrument	# returned
1st mailing	219
2nd mailing	128
Face-to-Face	210
Telephone	86

Table 5. Questionnaire returns by instrument.

One must approach this data, as with any survey data, with caution. The relatively high rate of return and the use of multiple vehicles to deliver the survey should have served to minimize inherent error. The rate of intermarriage is estimated to be 8.2% with a confidence level of 4.4% at .05 significance. A more extensive survey needs to be conducted to assess the more detailed patterns of inter-marriage. In the face of virtually no extant reliable data, this survey provides a basis upon which to formalize testable hypothesis.

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