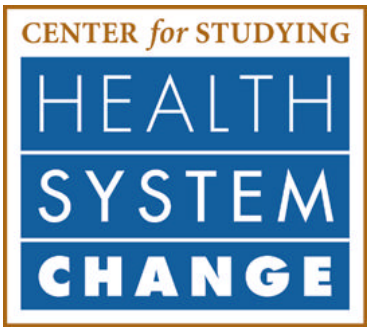
Community Tracking Study

Physician Survey Methodology Report 2000-01 (Round Three)



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Report on Survey Methods for the Community Tracking Study's 2001-2002 Round Three Physician Survey

Final Report
(Public Use File)

January 2003

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CONTENTS

CONTENTS *(continued)*

Chapter **Page**

CONTENTS *(continued)*

Chapter **Page**

CONTENTS *(continued)*

Chapter **Page**

LIST OF TABLES

TABLES *(continued)*

TABLES *(continued)*

LIST OF FIGURES

Figure **Page**

I. OVERVIEW

A. OBJECTIVES OF THE COMMUNITY TRACKING STUDY

The Community Tracking Study (CTS) is the core research effort of the Center for Studying Health System Change (HSC), a nonpartisan policy research organization located in Washington, DC, and funded by the Robert Wood Johnson Foundation. HSC's mission is to inform health care decision makers about changes in the health care system at both the local and the national level, as well as about how such changes will affect people. HSC conducts national surveys of those involved in or affected by changes in the health care system—households, physicians, employers—and interviews health care leaders in 12 communities.

The focus on markets is central to the design of the CTS. Understanding market changes requires a study both of local markets, including their culture and history, and of public policies relating to health care. To track change across the United States, we randomly selected 60 nationally representative communities stratified by whether metropolitan or nonmetropolitan, community size, and region (see Table I.1).[1]

The CTS examines 12 of the 60 communities in depth by conducting site visits and using survey samples large enough to draw conclusions about change in each community. The 12 communities make up a randomly selected subset of sites that are metropolitan areas with more than 200,000 people (as of July 1992). We refer to these as *high-intensity* sites.

B. ANALYTIC COMPONENTS OF THE COMMUNITY TRACKING STUDY

The CTS has qualitative and quantitative components, which are described below.

[1]The CTS covers the contiguous 48 states and the District of Columbia. Alaska and Hawaii were not part of the study.

TABLE I.1

SITES SELECTED FOR THE COMMUNITY TRACKING STUDY

High-Intensity Sites	Low-Intensity Sites		
Metropolitan Areas >200,000 Population[a]	Metropolitan Areas >200,000 Population[a]	Metropolitan Areas <200,000 Population[a]	Nonmetropolitan Areas
01-Boston MA	13-Atlanta GA	49-Dothan AL	52-West Central Alabama
02-Cleveland OH	14-Augusta GA/SC	50-Terre Haute IN	53-Central Arkansas
03-Greenville SC	15-Baltimore MD	51-Wilmington NC	54-Northern Georgia
04-Indianapolis IN	16-Bridgeport CT		55-Northeastern Illinois
05-Lansing MI	17-Chicago IL		56-Northeastern Indiana
06-Little Rock AR	18-Columbus OH		57-Eastern Maine
07-Miami FL	19-Denver CO		58-Eastern North Carolina
08-Newark NJ	20-Detroit MI		59-Northern Utah
09-Orange County CA	21-Greensboro NC		60-Northwestern Washington
10-Phoenix AZ	22-Houston TX		
11-Seattle WA	23-Huntington WV/KY/OH		
12-Syracuse NY	24-Killeen TX		
	25-Knoxville TN		
	26-Las Vegas NV/AZ		
	27-Los Angeles CA		
	28-Middlesex NJ		
	29-Milwaukee WI		
	30-Minneapolis MN/WI		
	31-Modesto CA		
	32-Nassau NY		
	33-New York City NY		
	34-Philadelphia PA/NJ		
	35-Pittsburgh PA		
	36-Portland OR/WA		
	37-Riverside CA		
	38-Rochester NY		
	39-San Antonio TX		
	40-San Francisco CA		
	41-Santa Rosa CA		
	42-Shreveport LA		
	43-St. Louis MO/IL		
	44-Tampa FL		
	45-Tulsa OK		
	46-Washington DC/MD/VA		
	47-West Palm Beach FL		
	48-Worcester MA		

NOTE: Numbers correspond to coding of the site identification variable in the survey.

[a]Based on 1992 Census estimates.

1. ***Site Visits.*** Researchers examine the forces affecting health care organizations and how they are responding by interviewing health care leaders in each of the 12 high-intensity sites. HSC conducts and manages the site visits, with assistance from outside researchers.

2. ***Household Survey.*** This survey, which comprises about 60,000 people in 33,000 families, focuses on assessing whether consumer access to the health care system is improving or declining over time. Particular areas of inquiry include access, satisfaction, use of services, and insurance coverage. The survey, three rounds of which have been completed, also collects information about health status and sociodemographic characteristics. To enhance the reliability of information on health plans, we conducted an "insurance followback" survey of the plans in which household respondents are enrolled in the first two rounds. HSC provides technical direction and oversight and Mathematica Policy Research (MPR) is responsible for sample design, data collection, and weights for the household and followback surveys.

3. ***Employer Survey.*** For the first round of the CTS, we interviewed 22,000 public and private employers to understand how the American population can access the health system nationally and locally. We asked these employers, which span size and industry sector, about the choice of plans they offer, how much their employees contribute to paying for their coverage, whether they participate in a purchasing alliance, and whether they provide high-quality information to their employees. HSC collaborated with RAND on the employer survey.

4. ***Physician Survey.*** A sample of more than 12,000 practicing physicians across the country offers perspective on how health care delivery is changing. Physicians respond to a series of questions about whether they are able to provide needed services for patients, how they are compensated, and what effect various care management strategies have on their practices, as well as questions about their practice arrangements. HSC provides technical direction and oversight for the physician survey, the Gallup Organization conducts the interviewing, and MPR is responsible for the sample design, sample weights, variance estimation, and tracing of physicians who could not be located.

Additional background on CTS is available at HSC's Web site (www.hschange.org).

C. THE ROUND THREE PHYSICIAN SURVEY

This report describes the design and conduct of the third round of the physician survey. The survey was completed by telephone, through computer-assisted telephone interviewing (CATI). We developed the sample frame by combining lists of physicians from the American Medical

Association and the American Osteopathic Association. Interviews were completed with 12,385 physicians in Round One, 12,304 in Round Two, and 12,406 in Round Three.

Reports describing the first two rounds of the physician survey are included in Technical Publications #9 and #32 (www.hschange.com). In this report, we discuss the sampling design of the Round Three sample (Chapter II), survey design and preparation (Chapter III), data collection (Chapter IV), and sample weighting (Chapter V). The appendixes present the survey instrument and advance materials (Appendix A) and provide additional detail on the equations used to compute the weights (Appendix B), an analysis of nonresponse (Appendix C), and an explanation of the conceptual framework for computing survey estimates combined across the site and supplemental samples (Appendix D).

II. SAMPLE DESIGN

For the three rounds of the CTS Physician Survey, interviews were conducted with a sample of physicians in the 60 CTS sites and with an independent national sample of physicians. The survey has the following three-tiered sample design, which allows us to develop estimates at the national and community (site) levels:

- ***The first tier is a sample of 12 communities from which a large number of physicians in each community was surveyed.*** The sample in each of these "high-intensity" sites is large enough to support estimates in each site.
- ***The second tier is a sample of 48 communities from which a smaller sample of physicians in each community was surveyed.*** This sample of "low-intensity" sites combined with the high intensity sites from the site sample and permits findings to be generalized to the nation.
- ***The third tier is a smaller, independent national sample.*** This *supplemental sample* augments the site sample and substantially increases the precision of national estimates with a modest increase in the total sample size.

We sampled primary care physicians (PCPs) at a higher rate than specialists in all rounds of the survey. Because the CTS Physician Survey has a longitudinal component (physicians sampled for Round Two are oversampled in Round Three), survey precision is affected by the amount of sample overlap between successive rounds. Therefore, a key design decision for each round is the amount of overlap between rounds. In addition, there are differences between sample frame and interview classifications of physicians as PCPs or specialists and between the two classifications of physicians' practice location. Procedures developed for identifying and adjusting for errors in specialty assignment and geographic misclassification in prior rounds were applied in the Round Three sample selection.

In the following sections, we describe site selection; the target population; our approach to the overlap, specialty assignment, and geographic misclassification issues; stratification; and sample selection procedures.

A. SITE SELECTION

The primary goal of the CTS is to track health system change and its effects on people at the local level. Determining which communities (sites) to study was therefore the first step in designing the CTS sample. Site selection involved three activities: (1) defining sites, (2) determining how many would be studied, and (3) selecting the sites.

1. Definition of Sites

The sites were intended to encompass the range of existing local health care markets. Although these markets have no set boundaries, the intent was to define areas such that residents used health care providers located predominantly in the same area, and providers served mostly area residents. To this end, we generally defined sites to be Metropolitan Statistical Areas (MSAs) as defined by the Office of Management and Budget or, in the case of nonmetropolitan sites, to be Bureau of Economic Analysis economic areas (BEAEAs). Metcalf et al. (1996) provide additional detail on the definition of CTS sites.

2. Number of Sites

The next step in creating the site sample was to determine the number of high-intensity sites. We considered the trade-offs between data collection costs (the cost of conducting case studies and surveys) and the research benefits of a large sample of sites. The research benefits include a greater ability to examine empirically the relationship between system change and its effect on

care delivery and consumers and increased "generalizability" of the study findings to the nation as a whole.

Despite the cost advantages of conducting intensive case studies in fewer sites, focusing on a smaller number of communities would have made it more difficult to distinguish between changes of general importance and changes or characteristics unique to a community. Solving this problem by increasing the number of case study sites would have increased the cost of data collection and analysis prohibitively. We therefore chose 12 sites for intensive study and added to this sample 48 sites that would be studied less intensively. The 60 high-intensity and low-intensity sites are primary sampling units (PSUs) and form the *site sample* (see Table I.1 in Chapter I).

Although we had no formal scientific basis for choosing 12 high-intensity sites, the number reflects a balance between the benefits of studying a range of different communities and data collection costs. The addition of 48 low-intensity sites solved the problem of limited generalizability associated with only 12 sites and provided a benchmark for interpreting the representativeness of the high-intensity sites relative to full sample of sites and the nation as a whole.

3. Site Selection

After the number of sites for the sample was determined, the next step was to select the actual sites. We chose the 60 sites for the first stage of sampling. We sampled sites by stratifying them geographically by region within three metropolitan status strata and then selecting them randomly, with probability proportional to their July 1992 population. We selected the CTS sites (or PSUs) independently in three strata, based on metropolitan status and size:

1. MSAs with 200,000 or more people (large MSAs)[1]
2. MSAs with fewer than 200,000 people (small MSAs)
3. Nonmetropolitan areas

In each of these strata, CTS sites were selected with probability proportional to the size of the civilian population (as of July 1992). For eight sites in the large MSA stratum, the population was sufficiently large that the site was selected with certainty. These eight sites were Boston (MA portion); Philadelphia, PA-NJ PMSA; Washington/Hagerstown PMSA; New York City; Detroit, MI PMSA; Chicago/Kenosha/Kankakee PMSA; Houston-Galveston-Brazoria, TX CMSA; and Los Angeles-Long Beach, CA PMSA. A ninth site (Baltimore, MD PMSA) was selected with certainty in the sample to complete coverage of the major cities of the Northeast Corridor.

In addition to the nine certainty selections, 39 sites were selected with probability proportional to their population size, using a sequential selection algorithm with selection controlled by geographic region. This allocation ensured that (1) all MSAs had a chance to be selected, (2) larger MSAs had a greater chance than smaller MSAs of being selected, and (3) the site sample would have an approximately proportional allocation across geographic regions.

For the small MSAs, three sites were selected with probability proportional to size, again using a sequential selection algorithm controlled by geographic region. For the nonmetropolitan areas, the first stage of selection was the state.[2] We also used the sequential selection algorithm

[1]Some sites were defined as primary metropolitan statistical areas (PMSAs) or consolidated metropolitan statistical areas (CMSAs).

[2]Washington, DC, and New Jersey were excluded because they do not have any nonmetropolitan areas. Alaska and Hawaii were excluded by the CTS study design.

(controlled again by geographic region) to select nine states with probability proportional to the size of their nonmetropolitan population. Based on nonmetropolitan groups used by the BEA, we selected one county group within each of these states with probability proportional to the population in these county groups.

Of the 60 sites in the CTS sample, 48 were selected in large MSAs, 3 in small MSAs, and 9 in nonmetropolitan areas. We selected the 12 high-intensity sites randomly from the 48 large MSA sites.

Together, the high-intensity and low-intensity sites were allocated for about 90 percent of all survey respondents. (We selected the remaining 10 percent for the supplemental sample, discussed later.) The site sample can be used to make national estimates and also to make site-specific estimates for the high-intensity sites. Users should be aware that, because of the smaller sample sizes in the low-intensity sites, site-specific estimates for these sites will be less precise.

4. Additional Samples for Better National Estimates

Although the site sample by itself would have yielded national estimates, the estimates would have been less precise than if we had sampled more communities, or if we had used a simple random sample of the entire U.S. population of physicians. We therefore added the *supplemental sample*—the third tier in the design of the CTS Physician Survey—to increase the precision of national estimates with only a small incremental increase in survey cost.

The supplemental sample is a small, nationally representative sample of physicians randomly selected from the 48 contiguous states and the District of Columbia. It is stratified by 10 geographic regions (based on the groups used by the AMA Socio-economic Monitoring System [SMS] Survey) crossed with physician specialty groupings (PCP and specialist), but it

essentially uses simple random sampling techniques within strata. The site sample and the supplemental sample comprise the *combined sample*.

In addition to increasing the precision of national estimates based on the site sample, the supplemental sample slightly improves site-specific estimates derived from the site sample. Because about half of all U.S. physicians are located in the 60 site-sample communities, about half the supplemental sample also falls within those communities. When making site-specific estimates, we can therefore augment observations from the individual site samples with observations from the supplemental sample. These are known as the *augmented site samples*.

B. TARGET POPULATION

The target population was based on information provided on the AMA Masterfile (which includes both AMA members and nonmembers) and on the AOA membership file.[3] To meet the initial eligibility criteria for sampling, physicians in the frame had to have completed their medical training, practice within the 48 contiguous states and the District of Columbia, and provide direct patient care for at least 20 hours per week. Residents, interns, and fellows were considered to be still in training and were excluded from the sample. The direct patient care criterion resulted in the exclusion of inactive physicians and physicians who were not office- or hospital-based (such as teachers, administrators, and researchers).

The following types of physicians were designated as ineligible for this survey and were removed from the frame:

[3]The AMA Masterfile includes licensed allopathic physicians and osteopathic physicians who obtained graduate training in allopathic medical schools or were identified on state licensing boards. The AOA membership file includes graduates of osteopathic medical schools. In addition, the AOA file often has, for osteopathic physicians, current addresses that may not be on the AMA Masterfile.

- Specialists in fields that do not focus primarily on direct patient care[4]
- Federal employees
- Graduates of foreign medical schools who are licensed to practice in the United States only temporarily

Eligible physicians were then classified as either PCP or specialist. PCPs were defined as physicians with a primary specialty of family practice, general practice, general internal medicine, internal medicine/pediatrics, or general pediatrics. All others with survey-eligible specialties were classified as specialists.

The interviewer verified physician eligibility before continuing with the survey. The attributes that were verified during the interview included whether the physician (1) was a federal employee, (2) was a resident or fellow, and (3) provided patient care for less than 20 hours a week. Physicians who were eligible based on the AMA or AOA Masterfile data, but were ineligible at the time of the interview, were excluded from data collection as ineligible.

C. DESIGN ISSUES

The precision requirements for cross-sectional site and national estimates, shown in Table II.3, were the same for all rounds. The precision requirements were specified in terms of effective sample size (the sample size after accounting for the complexity of the sample design) for the high and low intensity sites and physician classification. No precision requirements were specified for national estimates, except that the number of completed interviews would include approximately 12,400 physicians.

[4]Tables II.1 and II.2 list the specialties excluded from the frame.

TABLE II.1

SPECIALTIES EXCLUDED FROM THE AMA FILES

Allergy and Immunology/Clinical Laboratory (ALI)

Aerospace Medicine (AM)

Anatomic Pathology (ATP)

Anesthesiology (AN)

Bloodbanking/ Transfusion Medicine (BBK)

Clinical Pathology (CLP)

Clinical Pharmacology (PA)

Clinical and Lab Dermotological Immunology (DDL)

Cytopathology (PCP)

Diagnostic Radiology (DR)

Dermatopathology (DMP)

Epidemiology (EP)

Flex residents (FLX)

Forensic Pathology (FOP)

Forensic Psychiatry (PFP)

Hematology/Pathology (HMP)

*Immunopathology (PIP)

Legal Medicine (LM)

*Maxillofacial Radiology (MXR)

Medical Management (MDM)

Medical Microbiology (MM)

Medical Toxicology EM (ETX)

Medical Toxicology Pediatrics (PDT)

Medical Toxicology Preventive Medicine (PTX)

Neuropathology (NP)

Neuroradiology (RNR)

Nuclear Medicine (NM)

Nuclear Radiology (NR)

Other specialty (OS)

Pain Management –AN (APM)

Pathology (PTH)

Pathology Chemical (PCH)

Pediatric Anesthesiology (PDR)

Pediatric Pathology (PP)

Pediatric Radiology (PDR)

Public Health and General Preventive Medicine (MPH)

*Radiological Physics (RP)

Radiology (R)

Selective Pathology (SP)

Underseas Medicine (UM)

Unspecified(US)

Vascular and Interventional Radiology (VIR)

*These specialties were excluded but did not appear on the AMA Masterfile used to select physicians for Round Three.

TABLE II.2

SPECIALITIES EXCLUDED FROM THE AOA FILE

Aerospace Medicine (AM)	Legal Medicine (LM)	Pediatric Pathology (PP)
Anatomic Pathology (ATP)	Nuclear Medicine (NM)	Public Health (PH)
Anesthesiology (AN)	Nuclear Radiology (NR)	Radiology (R)
Chemical Pathology (CLP)	Other specialty not specified (OS)	Radiation Oncology (RO)
Diagnostic Radiology (DR)	Pain Management Anesthesiology (APM)	Underseas Medicine (UM)
Forensic Pathology (FOP)	Pathology (PTH)	Vascular and Interventional Radiology (VIR)

Note: The longer list of specialties excluded from the AMA Masterfile were also excluded from the AOA file. However, we only listed excluded specialties that were on the AOA file used to select physicians for Round Three.

TABLE II.3

SURVEY PRECISION REQUIREMENTS

Survey	Estimation Category	Effective Sample Sizes			Sampling Error for P=0.5		
		PCP	Specialist	Combined	PCP	Specialist	Combined
Site	High-intensity site	400	200	433	0.025	0.035	0.024
Site	Low-intensity site	100	50	114	0.050	0.071	0.047
Site[a]	National	3,450	2,645	4,285	0.009	0.010	0.008
Supplement[b]	National	515	685	1,200	0.022	0.019	0.014

PCP = primary care physician.

[a]No specified constraint for national-level estimates from the site sample; numbers in this case are approximated by average design effects.

[b]For the supplemental sample, the sample was proportionately allocated across physician classification (PCP or specialist) and geographic region.

Because this study has a longitudinal component, survey precision is influenced by the amount of sample (respondents) overlap across survey rounds. In this section, we explain how we chose the amount of overlap between surveys.

Physician specialty and practice location could be defined differently in the sample frame (AMA and AOA files) and in the interview. This section also discusses procedures for identifying and adjusting for errors in specialty assignment and geographic misclassification in the sample design.

1. Sample Overlap

A common feature of surveys with a longitudinal component is the selection of sampling units in one round of a survey for participation in the next round. In this case, physicians are the sampling unit. Including a portion of the physicians who responded to Round Two in the Round Three sample may increase precision substantially for change estimates and, to a lesser extent, for cross-sectional estimates. At the same time, to ensure complete population coverage in Round Three and to minimize respondent burden and conditioning (because repeated contacts may influence survey responses), some proportion of the Round Two sample should be replaced to represent physicians who had no chance of being selected in prior rounds.

We considered several factors when determining the optimum level of sample replacement, including coverage bias, the precision of cross-sectional and change estimates, and possible correlations between rounds that will improve survey estimates. Our analysis based on Round Two costs and response rates implied that a reinterview rate of 60 to 70 percent (physicians who responded in Round Two who responded again in Round Three) is advantageous both for cost and for precision reasons. Based on an expected eligibility and response rate for reinterviewed physicians of 67 percent, the sample overlap was set at 100 percent for Round Two interviews

and 80 percent of the Round Two noninterviews. In the next section, we discuss the benefits and drawbacks of increasing the degree of overlap between rounds and show how we arrived at the optimum level of overlap.

a. Benefits and Drawbacks of Increasing Overlap

Increasing the degree of sample overlap between rounds also increases the precision of change estimates. The optimal overlap (for estimates of change) for any variables with positive correlations between rounds is 100 percent; however, the potential for gains in precision depends on the degree of correlation between rounds. Increasing the overlap too much can lead to coverage bias for cross-sectional estimates. Since the number of responding physicians was fixed at about 12,400, if the overlap portion of the sample includes the entire sample from the previous survey, the new sample for the round will have little or no opportunity to represent physicians who were not in the sampling frame for the previous round.

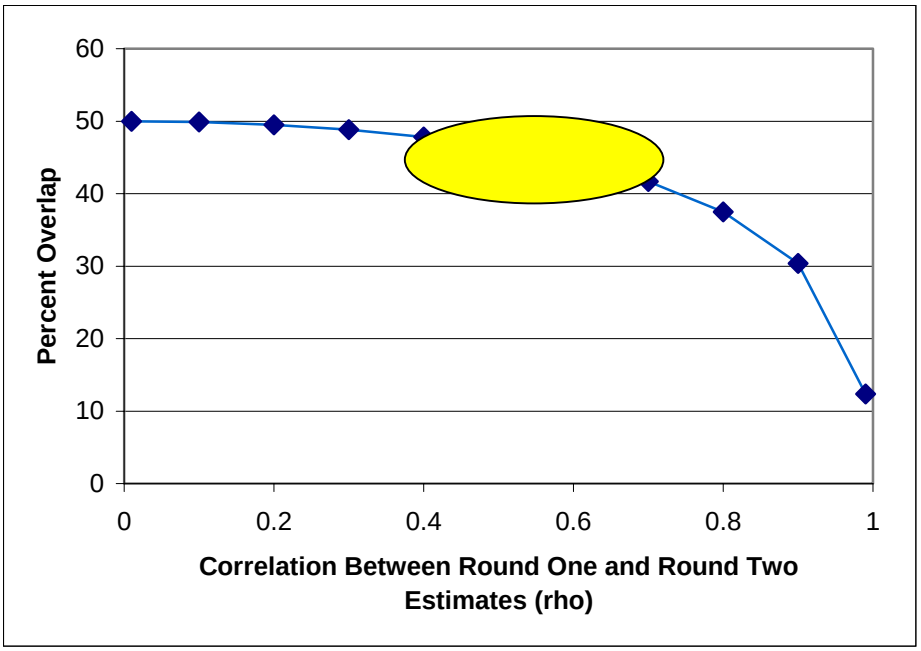
A high degree of overlap also can be less than optimal for certain cross-sectional estimators. That is, the degree of overlap can affect the precision of cross-sectional estimates if it increases the design effect due to unequal weighting. Since the overall respondent sample size is fixed, as the overlap is increased, the sample size available to represent the physicians not in the previous sampling frame is decreased and the weights for sample members representing these nonrespondents become relatively larger.

b. Optimal Overlap

A key question for Rounds Two and Three was what overlap between rounds was optimal. Because no information was available about the level of correlation between rounds for key study variables in Round Two, we reviewed the sensitivity of optimal overlap at different levels of correlation. Figure II.1 shows that 40 to 50 percent overlap is desirable for a range of the

FIGURE II.1

OPTIMUM SAMPLE OVERLAP FOR DIFFERENT LEVELS OF CORRELATION BETWEEN SURVEY ESTIMATES IN CONSECUTIVE ROUNDS



most likely levels of correlation. For the Round Three overlap, however, we had information about relative costs and response rates for the various categories of physicians on the sampling frame. The response rates were higher and interviewing costs lower for Round One physicians sampled in Round Two compared with physicians sampled for the first time in Round Two. We used this information to justify an increase in the size of the overlap sample for Round Three compared to Round Two.

For change estimates between rounds, the optimum level of overlap is 100 percent. For regression-type estimates of Round Three statistics, the optimum level depends on the amount of correlation between observations obtained for both rounds. The form of the regression estimates for Round Three being considered here is:

(1) $\bar{y}' = \phi_2 \bar{y}'_{2u} + (1 - \phi_2)\bar{y}'_{2m}$,

where:

ϕ_2 = a function of reciprocal variances
$\bar{y}'_{2u} = \bar{y}_{2u}$
$\bar{y}'_{2m} = \bar{y}_{2m} + b(\bar{y}_1 - \bar{y}_{1m})$,

and b is a constant (for example = 1) or is estimated from data.

In this form, the means without the prime are the simple means for the matched and unmatched portions of the sample. The primed means, estimated from regression-type equations, are then combined using a parameter (ϕ) involving ratios of reciprocal variances (Cochran 1965).

From Figure II.1, we note that the maximum optimum overlap for these estimators does not exceed 50 percent and, for most typical correlations, is in the range of 40 to 50 percent. The target overlap for Round One respondents who would be respondents in Round Two was 46 percent; for Round Three, the target overlap rates of respondents to both rounds were increased to 61 percent and 73 percent of the Round Two completed interviews, for PCPs and specialists, respectively. We used information from Round Two costs and response rates and robustness of the cross-section estimates (as shown in Figure II.2) to support the increase in the overlap.

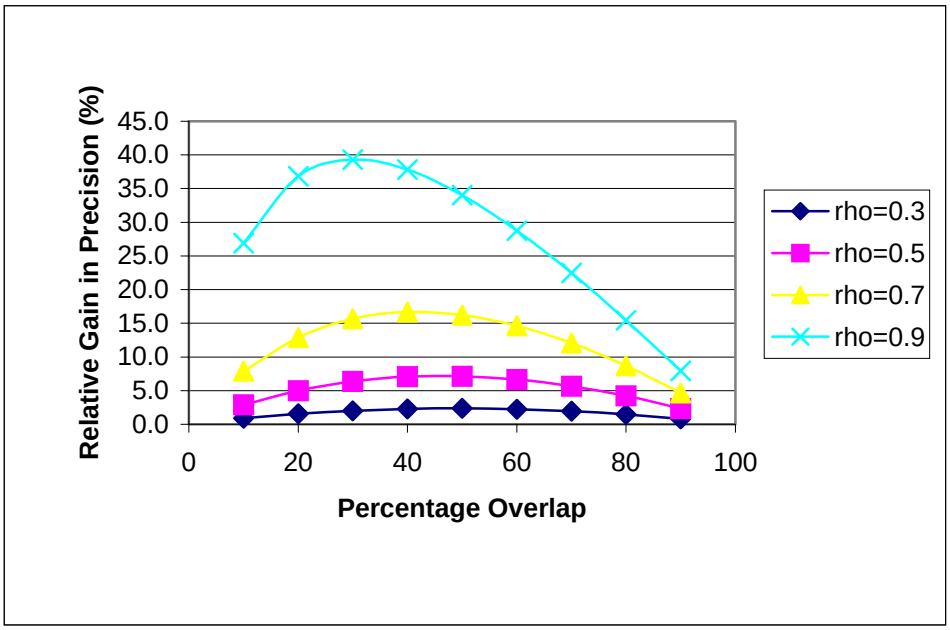
To investigate the robustness of such estimators, we examine the relative efficiency for different levels of overlap (Figure II.2). We are interested in optimum levels of overlap and loss of potential gain as we move away from that optimum. Four values for the between-round correlation coefficient (rho) are presented. Clearly, little is gained from these estimators for values of rho of less than 0.5. We can also see that, as rho increases, the optimum percentage overlap decreases. Finally, except for very large correlations, fairly large departures from optimum overlap do not seriously reduce the gain in precision.

2. Errors in Specialty Assignment

In preparing the sample frame, physicians were classified as PCPs or specialists, based on the primary specialty in the AMA and AOA files (as defined in Section B). During the interview, physicians were asked to verify their primary specialties. In some cases, they cited a

FIGURE II.2

RELATIVE EFFICIENCY FOR DIFFERENT LEVELS OF OVERLAP



specialty other than the one listed for them in the AMA or AOA file, necessitating a change in classification. These physicians, whom we describe as *switchers*, were reclassified for some analyses, but their selection probabilities remained unchanged. Some unequal weighting resulted from the reclassification, but the number of switchers was small. In Round Two, 7 percent of physicians classified in the sample frames as PCPs responded as specialists, and 4 percent classified in the sample frames as specialists responded as PCPs. Because PCPs and specialists

comprised separate strata with sample size targets, we needed to predict switching in the sample allocation to maintain the desired precision.

3. Geographic Misclassification

A goal of the sample design was to assign physicians to a site based on the location of their main practice. Operationally, we classified physicians listed in the AMA or AOA sample frame by the county of their "preferred mailing address," as that address was the most current on the files. However, AMA staff indicated that many of these are home addresses rather than main practice locations. In other cases, physicians had moved their practices since the last file update. Nevertheless, even if the actual current practice location did not match the preferred mailing address on the AMA or AOA file, the two addresses usually were within the same site.

In response to the survey question about practice location, some physicians gave a different address. As a result, some of them moved from one survey site to another. Others were classified as being outside the boundaries of any of the 60 sites. These cases are known as *movers,* even though many of the preferred mailing addresses simply may have been home addresses located in other than the main practice site.

For sampling purposes, physicians remained in the site from which they were originally selected. For example, a physician selected in site A in Round One who actually practiced outside the site (a mover) was considered to be in site A for sample selection purposes in subsequent rounds of the survey. Also, physicians in the Round Two sample who had a practice address outside the 60 sites for the survey were kept in the sampling frame for Round Three. Maintaining the original site assignment enhanced the survey's coverage of physicians in the 48 contiguous states and the District of Columbia. If we had not retained these physicians, we would have progressively lost cases with each round of the survey.

For site-level estimates, physicians for the site sample were linked to the site in which they practiced, rather than to the site from which they originally were sampled. Some physicians therefore were selected from a site that did not contain their practice. If the practice was outside the 60 sites, we did not use them in site-level estimates. We also did not use them in some national estimates that used site-level independent variables. However, if we selected them from a site other than the one in which they practiced, we included them in the site sample for site-level estimates and for all national estimates. We considered a mover to be a member of the site sample for site-level estimates and some national estimates only if both the original address (based on the preferred mailing address) and the interview location were in the site sample. The probability that both locations would be in the site sample is referred to as the *joint inclusion probability*. Joint inclusion can result in large sampling variances that subsequently must be subjected to weight trimming (discussed in Chapter V).

Because some preferred mailing addresses were the same as the home addresses, suburban sites tended to lose more physicians and the more urbanized areas tended to gain them. We adjusted the sample sizes for individual sites for the Round Three allocation to account for anticipated gains or losses caused by these movers.

D. IMPLEMENTATION

1. Sampling Frame

As in previous rounds, the sampling frame was developed from physician records maintained by the AMA and AOA. These files contained the most recent information available from the two organizations as of May 2000, just prior to the date used to select the Round Three

sample. The data fields for the full file included names, telephone numbers, addresses, dates of birth, specialties, and other information useful for sampling and data collection. We also used selected information from the Round Two frame and survey results in the frame development.

The five key steps used to construct the frame were:

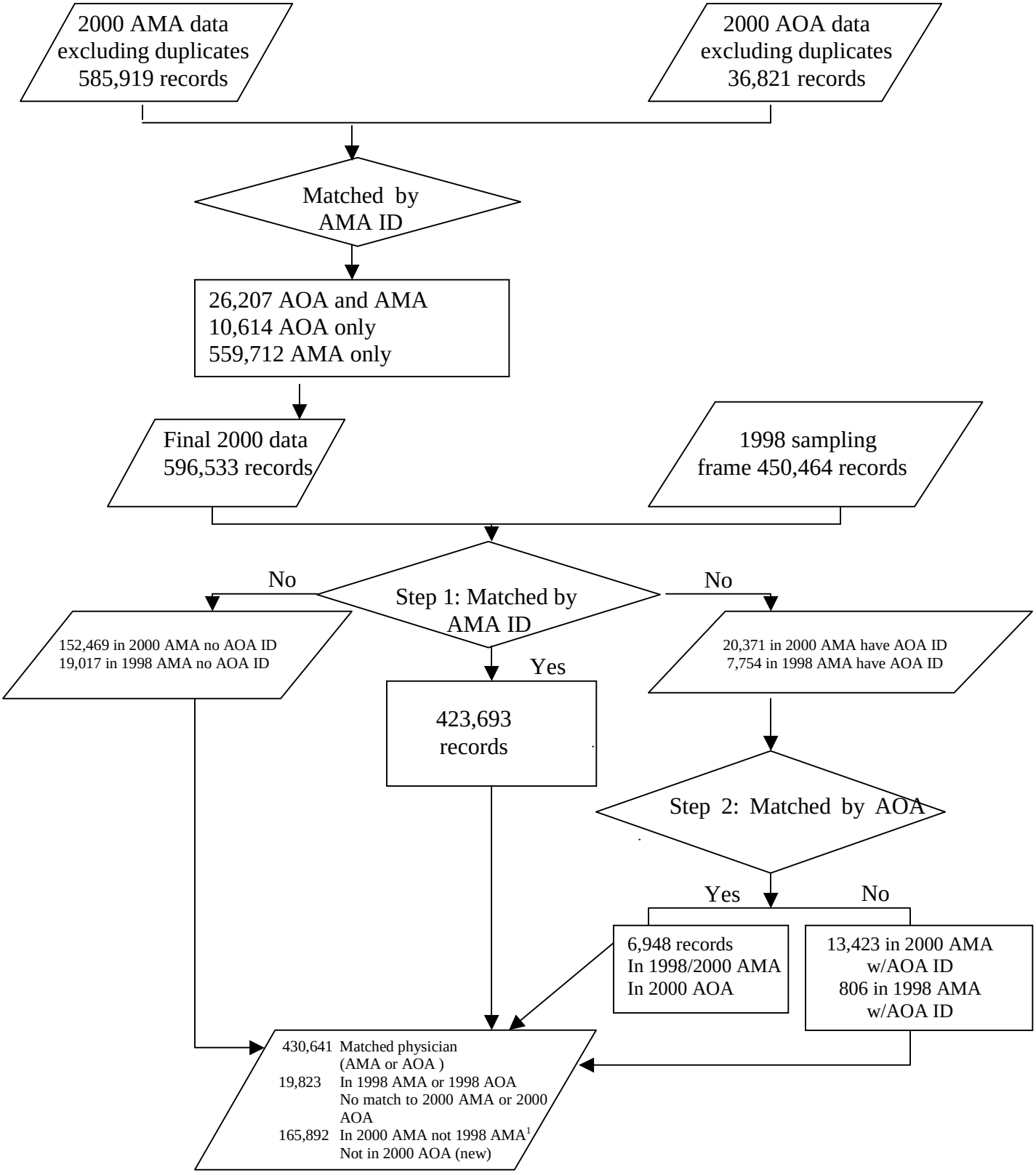
1. Specifying file content and format for ordering the files
2. Verifying file content after receiving the AMA and AOA files
3. Matching the 2000 AMA and AOA files against each other and the Round Two sample frame to identify physicians added to the sample frames since Round Two
4. Excluding ineligible physicians
5. Classifying records by primary design strata and site and by the specialty and Round Two outcome secondary strata

The complete list of physicians for the Round Two and Round Three sampling frames were obtained from the AMA and AOA. After reviewing frequency counts for key items to ensure file accuracy and completeness, we performed a series of processing steps (Figure II.3). We matched the AMA and AOA files to identify physicians in each file; then we matched the combined AMA/AOA file to the Round Two frame and sample. We performed a computer match by AMA identification number to determine which physicians were on both AMA and AOA files and which were new to the Round Three frame. Two types of nonmatches resulted: (1) physicians on the Round Two frame who were not identified on the Round Three list, and (2) physicians on the Round Three list but not on the Round Two frame.

Physicians on the Round Three list that were not in the Round Two frame were excluded as ineligible if their primary specialty was listed on Tables II.1 (AMA) or II.2 (AOA), if their major professional activity was administration, teaching, or research, or their main practice was not in one of the 48 contiguous states in the District of Columbia.

FIGURE II.3

PHYSICIAN SURVEY (2000-2001): COMBINE 2000 DATA SETS AND 1998[1]



[1]A total of 133,691 physicians were excluded as ineligible, resulting in 482,665 physicians in the 2000 sampling frame.

Matched records and new records also were excluded from the frame if they were currently classified by the AMA or AOA as retired, deceased, or practicing in a foreign country.

Because physicians are added to the AMA and AOA files on an ongoing basis, we had to identify physicians in the Round Three frame who were not in the Round Two frame to define them as a separate stratum and to receive a specific sample allocation.

The records were then assigned to primary design strata and sampling classes, and the sample was allocated on the basis of the counts to these strata and classes. (Section D.2 discusses primary design strata and sampling classes.)

Next, each physician was linked to an appropriate site or stratum. For sampling purposes, we based the site designation and geographic stratum on the physician's preferred mailing address on the AMA and AOA files.

Finally, each physician was classified as either PCP or specialist. This classification was based on the Round Two survey response (if available) or on the AMA or AOA specialty code.

2. Sampling Units and Stratification

Stratification, a feature of most large-scale surveys, performs several important functions. Using strata containing populations that are expected to have similar responses can increase survey precision. Another key function of stratification is to ensure an adequate sample size for important study populations. Stratification also is a useful tool for optimum allocation in surveys in which some groups exhibit more variability in responses or are more costly to survey. The design for Round Three used stratification to improve precision and to ensure adequate representation by site, geographic region, population density, and physicians who were new to

the frame. We also used stratification to control precision for survey estimates of PCPs and specialists.[5]

In the following sections, we describe procedures for selecting the site and supplemental samples (see Table II.5).

a. Site Sample

The sample of sites was stratified geographically by region and population size and was selected with probability proportional to size (estimated population for July 1992). Within each site, we stratified the sample by PCPs and specialists (primary strata) and by the following four sampling classes[6]:

1. Physicians who completed interviews in Round Two
2. Physicians who were selected for Round Two but did not complete interviews (refusals, ineligible, unlocated)
3. Physicians who were in the AMA/AOA sample frames for Round Two but were not selected in the sample
4. Physicians who were not in the AMA/AOA sample frames for Round Two and were new to the frame for Round Three

The number of physicians available in each site and sampling class varied substantially among the sites. However, the CTS design specifies a larger effective sample in Lansing or

[5]We expect that some groups sampled for Round Three, such as physicians who could not be located or who refused in Round Two, will be more costly to survey or will have lower response rates. We used data from Round Two on interviewing costs and response rates to optimize sampling rates for different groups of Round Two respondents for Round Three.

[6]The first three sampling classes are partitions of the Round Two sampling frame with the first two comprising the Round Two sample. These two differ by survey outcome. The fourth sampling class represent physicians new to the sampling frame.

TABLE II.5

STRATIFICATION AND SAMPLING ASSUMPTIONS AND SPECIFICATIONS FOR THE COMMUNITY TRACKING STUDY PHYSICIAN SURVEY

Sample	Primary Strata	Site Definition	Site Selection Classification[a]	Selection Assumptions	Primary Unit	Within-Site Stratification	Secondary Unit
Site Sample	1. MSAs with >200,000 population (1992 Census Bureau data)	MSAs	Certainty sites (9)	Equal probability with replacement sampling within sites	CTS site	PCP/specialist (2) with frame sampling classes (4)[b]	Physician
			Noncertainty sites (39)	PPS without replacement sampling of sites and equal probability with replacement sampling within sites	CTS site	PCP/specialist (2) with frame sampling classes (4)[b]	Physician
	2. MSAs with <200,000 population (1992)	MSAs	Noncertainty sites (3)	PPS without replacement sampling of sites and equal probability with replacement sampling within sites	CTS site	PCP/specialist (2) with frame sampling classes (4)[b]	Physician
	3. Nonmetropolitan areas	BEA county groups	Noncertainty sites (9)	PPS without replacement sampling of sites and equal probability with replacement sampling within sites	CTS site	PCP/specialist (2) with frame sampling classes (4)[b]	Physician
Supplemental Sample	Geographic regions (10),[c] PCP/specialist (2), and frame sampling classes (4)[b]	n.a.	n.a.	Equal probability with replacement within strata	Physician	n.a.	n.a.

[a]Of the 48 MSAs with population >200,000, 9 were selected with certainty. Site selection procedures differed for these sites. (See Section II.A.3.)

[b]The four secondary frame sampling classes are (1) Round Two completes; (2) Round Two noninterviews (including nonrespondents, ineligible respondents, and unlocatable physicians); (3) physicians in the Round Two AMA or AOA frames who were not sampled for Round Two; and (4) physicians who were not in the Round Two AMA or AOA frames but who were new to the frames for Round Three.

[c]Region Strata States (Federal Information Processing System State Codes)

1 09, 23, 25, 33, 44, 50
2 36
3 10, 34, 42, 54
4 11, 13,. 24, 37, 45, 51
5 01, 12, 21, 28, 47
6 05, 22, 29, 40, 48
7 18, 26, 39
8 17, 19, 27, 55
9 04, 08, 16, 20, 30, 31, 32, 35, 38, 41, 46, 49, 53, 56
10 06

n.a. = not applicable.

Little Rock (which are high-intensity sites) than in New York, Los Angeles, and Chicago combined (each of which is a low-intensity site). The smaller pool of physicians and larger effective sample size for some of the high-intensity sites required the use of the finite population correction in the computation of the nominal sample size. The sample allocation process also had to account for stratification and geographic and specialty misclassification.

The sample size and allocation were based on the precision requirements, the frame counts, and the stratification. Table II.3 specifies the precision requirement (in terms of effective sample size) for each site for PCPs and specialists. The effective sample sizes were adjusted to compensate for design effects (especially the finite correction); switching among patient care classifications; geographic misclassification; and expected nonresponse from unlocatable, ineligible, or nonresponding physicians. For all sites, we used a constant design effect (deff) in addition to the site-specific finite population correction factor. The sample sizes were then adjusted for physicians who may have been geographically misclassified by practice location and for physicians who may have been incorrectly classified as PCPs or specialists.

The sample sizes also were adjusted for expected errors in specialty assignment (switchers) and geographic misclassification (movers), based on Round Two experience. We calculated the adjustment factor as:

(2) $F = S/(S - L + G)$,

where the denominator is equal to the starting number S minus the loss L plus the gain G.

For movers, we made site-specific adjustments. For switchers, we made site-specific adjustments for the high-intensity sites and overall average adjustments for low-intensity sites (1.06918 for PCPs and 0.90294 for specialists). We then adjusted the sample sizes to accommodate sample losses resulting from ineligibility, nonresponse, and inability to locate

some physicians. We allocated these numbers, which are referred to as the *base sample*, to the frame sampling classes. We used the projected response rates for each sampling class to check that the allocation met the target values in each cell.

The allocation rule was to assign to the frame cells 100 percent of the Round Two completes, 80 percent of the Round Two noninterviews (we excluded physicians who were deceased, retired, or out of the country), and a proportional number of new cases (physicians new to the frame in 2000). We wanted to allocate proportionally as much sample as possible to control the variation in weights. To obtain a minimum of five interviews in each sampling class, we permitted some departures from this ideal. Consequently the base sample included slightly less than 100 percent of the Round Two completes.

The expected results were obtained by adjusting for an anticipated completion rate (that is, the number of Round Two completed interviews divided by the number fielded in each site, where the fielded sample included completes, nonrespondents, ineligible respondents, and unlocated physicians). We used the Round Two site-specific completion rates (which averaged 45.2 percent for PCPs, 53.8 percent for specialists) to adjust the sample sizes from the pool of physicians in the Round Two frames who were not part of the Round Two sample and from the pool of physicians who were new to the frame since Round Two. For all sites, the projected completion rate was 70.2 percent for the Round Two completes and 21.7 percent for the Round Two noninterviews.

To control for possible changes in response and eligibility, we selected an *augmented sample,* which included the base sample and a reserve sample equal in size to approximately 50 percent of the base sample. To select the augmented sample, we increased the sampling rate to 100 percent for the sampling class of Round Two completes, including those that had not already been allocated to the base sample. Likewise, we increased the Round Two noninterviews to a

100 percent sampling rate. The overall increase in sample size for the augmented sample compared to the base sample was 43 percent. A substantial proportion of the augmented sample was ultimately fielded in order to approach the target nominal sample sizes.

b. Supplemental Sample

The supplemental sample was a stratified simple random sample of physicians and was independent of the site sample. The population counts and the nominal sample (or expected number of completed interviews) by region and by strata and sampling classes are shown in Table II.8. As with the site sample, the eight secondary strata and sampling classes were PCPs and specialists for each of the four sampling classes: (1) physicians who completed interviews in Round Two; (2) physicians who were sampled for Round Two but who did not complete interviews (that is, refusal, ineligible, or unlocatable physicians); (3) physicians in the sample frame for Round Two who were not selected; and (4) physicians who were new to the sample frame in 2000.

The basic allocation of the four sampling classes assigned a sample of 100 percent of the Round Two completes and nearly 80 percent of the Round Two noninterviews (except for deceased, retired, and physicians not practicing in the United States) to the two sampling classes for the Round Three sample. We then assigned a proportional number to the stratum of physicians who were new to the Round Three frame; the intent was to include physicians new to the Round Three frame at approximately the same rate as those included from the Round Two frame. Finally, in order to reach the target total, we assigned part of the sample to the sampling class of physicians who were in the Round Two frame but were not selected in Round Two. We had to make some exceptions when the frame counts would not permit this allocation, such as

TABLE II.8

FRAME AND SAMPLE COUNTS FOR THE ROUND THREE SUPPLEMENTAL SAMPLE

	Round Three Frame Counts										
	Round Two Response/ PCP Status					Round Two Frame Not Sampled		New Frame (2000)		Nominal Sample	
National Regions	Round Two Sample	Complete PCP	Complete Specialist	Non Int PCP	Non Int Specialist	PCP	Specialist	PCP	Specialist	PCP	Specialist
1	132	24	40	26	42	9,266	16,665	2,103	2,954	36	60
2	194	39	61	37	57	13,614	23,961	3,270	4,884	55	89
3	204	43	69	46	46	15,608	25,013	3,704	4,158	62	93
4	237	48	83	46	60	17,341	29,416	3,658	5,157	68	112
5	223	43	62	48	70	17,398	27,909	3,293	4,228	64	95
6	221	58	65	36	62	17,414	26,901	3,871	4,904	74	96
7	189	37	60	44	48	14,541	21,993	4,018	4,097	57	83
8	176	40	59	37	40	15,532	20,338	3,102	3,602	58	78
9	208	54	71	32	51	17,183	25,198	3,650	3,853	70	95
10	249	49	67	52	81	19,331	29,897	3,402	4,205	72	103
Total	2,033	435	637	404	557	157,228	247,291	34,071	42,042	615	903

[a]The target nominal samples by national region do not sum to the totals because of expected switching between PCPs and specialists and to rounding error in computing nominal sample sizes from sampling clases.

Complete = Round Two completed interview;
Non Int = Round Two noninterview (including nonrespondents, ineligible respondents, and unlocatable physicians).

when fewer physicians were available in a stratum than had been allocated to the stratum and when the allocation would have resulted in fewer than five interviews without adjustments.

We began with the target effective sample and then, to determine the nominal sample size, adjusted that sample on the basis of the Round Two design effect. We then adjusted the nominal sample size to account for geographic and specialty misclassification and other attrition. The misclassification factor was calculated as:

(3) $F = S/(S - L + G)$,

where the denominator is equal to the starting number S minus the loss L plus the gain G.

The misclassification counts were apportioned by region and stochastically rounded. No adjustment had to be made in the supplemental sample for geographic misclassification (movers).

These region-specific samples were then allocated to the four sampling classes strata according to two rules: (1) the regional sample was to include essentially all the Round Two completes and 80 percent of the Round Two noninterviews, and (2) the remaining sample size was to be assigned proportionally to the physicians who were *new* to the frame and (if necessary) to physicians in the Round Two frame who were not selected for the Round Two sample.

Using projected completion rates based on experience of Round Two for the four strata, and the proportional adjustments made to the counts, we checked whether the allocation would satisfy the target nominal sample sizes.[7] If it would, we stochastically rounded the numbers to obtain the final base sample. As with the site sample, we increased these numbers to obtain an augmented sample that allowed for approximately a 50 percent reserve sample in each stratum.

[7]The completion rate is the number of completed eligible interviews divided by the total sample.

III. SURVEY DESIGN AND PREPARATION

A. SCHEDULE

Survey preparation and data collection for the Round Three Physician Survey were conducted from February 2000 through December 2001 (Table III.1). HSC and Gallup staff prepared the survey, including making changes to the questionnaire, conducting pilot testing, and revising training materials, from February through August 2000. Gallup mailed advance letters on August 23; conducted interviewing between August 30, 2000, and November 21, 2001; and Gallup delivered a final data file on December 12, 2001. Table III.1 lists the dates for key study activities:

TABLE III.1

ROUND THREE PHYSICIAN SURVEY SCHEDULE

Dates	Activities
2/1/00–8/10/00	Design questionnaire, perform cognitive testing, pretesting, and instrument programming
6/12/00–8/22/00	Renew study endorsements
7/31/00	Approve advance letter
6/30/00–8/4/00	Conduct pilot test
8/7/00–8/29/00	Prepare sample for field
7/27/00–8/11/00	Develop interviewer training materials
8/15/00	Train interviewers
8/29/00–11/21/01	Mail advance letters and do interviewing
12/1/01	Deliver interim data and mover file
12/12/01	Deliver final data

B. INSTRUMENT DEVELOPMENT

Except for one module that was dropped, the Round Three survey instrument (see Appendix A) retained the same organizational structure as in Round Two; survey sections, or modules, are shown below:

A. Introduction and screening
B. Utilization of time
C. Type and size of practice
D. Medical care management
E. Patient vignettes (dropped for Round Three)
F. Physician-patient interaction
G. Practice revenue
H. Physician compensation methods and income level
I. Verification of name and practice address
J. Physician comments

Changes made to the Round Three instrument are shown in Table III.2. New questions were cognitively tested on 20 primary care physicians (PCPs) and 10 specialists to assess their understanding of terminology and concepts. Topics included selection bias, financial incentives and market competition, ability to obtain services, consumer information, and information on technology and care management.

C. PRETEST

Because we made several changes to the instrument between Rounds Two and Three (see Table III.2), the scope of the Round Three pretest was more extensive than between Rounds One and Two. The objective of the pretest was to assess changes and additions made for Round Three by checking skip patterns and wording, verifying that the CATI program did not contain

TABLE III.2

CHANGES TO THE ROUND THREE PHYSICIAN SURVEY

Question Number	Item	Content
Added Questions		
C12	Choice of practice arrangement	Developed a four-factor scale (control over hours, business aspects of practice, clinical autonomy, and income) to control for selection bias in measuring choice of practice arrangement.
C6b	Practice arrangements	Differentiated practice setting for hospital/ medical school employees and obtained office-based questions on practice size.
H10b, H10b1 (located after C12 for half the sample and after H10a for the other half)	Financial incentives	To control for question order effects, randomized questions on financial incentives between Modules C and H. H10b and H10b1 ask about the impact of financial incentives on level of patient services.
H10c	Market competition	Added a direct measure of perceived competition lacking in previous surveys.
F8 (new response code added); F8a (new question)	Ability to obtain services	Added questions to ask physicians directly what barriers they face in obtaining needed services instead of constructing them through multivariate analyses, as in past surveys. Questions include why physicians have problems obtaining services for referrals, non-emergency admissions, and outpatient mental health services.
F9G, F10	Practice adding uninsured and capitated patients	Modified current question (F9) to capture willingness to accept uninsured people who can't pay full fee and capitated patients. Expanded scope of current question to incorporate key subgroups omitted from first two rounds.
B7-11	Consumer information	Added companion questions to household survey on provider perceptions of patient generated DTC advertising and Internet demand and effect on quality of care. Will add provider perspective on the impact of patient generated demand.

TABLE III.2 *(continued)*

Question Number	Item	Content
D1-3, D4A1, D4B1, D4C1, D5	Information technology and care management	Designed comprehensive module: (1) to maintain tracking for 3 key care management measures, (2) to develop new care management questions, and (3) to measure prevalence with which various information technology tools are used and direction and magnitude of effect. Changes retain tracking of selected tools, correct limitations in current questions, and permit future tracking of prevalence, direction, and size of impact of tools on quality and efficiency.
Deleted Questions		
G9-11	Practice revenue	Deleted questions on share of practice revenues from largest managed care contract (G9 and G11) because questions were difficult for physicians and were not reliable.
Module E	Patient vignettes	Obtained sufficient data from the first two rounds of the survey to allow analysis of the vignettes. These questions were dropped for Round Three to make room for other topics.

any errors, and evaluating the time required to administer the interview. A pretest sample, divided equally between PCPs and specialists, was provided to Gallup. Seventy pretest cases were completed, 36 with PCPs and 34 with specialists. All the pretest interviews were conducted with physicians who had not participated in the previous rounds. Five executive interviewers completed the pretest interviews during a 26-day period, with the interviews averaging 25.9 minutes. Following the pretest, we eliminated questions to reduce the average length of the Round Three interview; the actual mean length for Round Three was 20.8 minutes.

D. PREPARATION OF ADVANCE LETTER

As in previous rounds, we prepared and mailed an advance letter to sampled respondents one week before the release of each sample (all together, there were 17 releases). Because endorsement by medical societies generally increases response rates, we asked societies that endorsed Rounds One and Two to provide their endorsement for Round Three. All of them agreed to do so.[1] In addition to the letter describing the survey and requesting the physician's participation, initial mailings included copies of a brochure describing HSC and HSC Issue Brief #24 (see Appendix A). We used three versions of the advance letter. The first (version one) was similar to the letter used during Rounds One and Two and was mailed to physicians who were not sampled or had not been reached during the prior two rounds. Versions two and three were sent to physicians who participated in the Round Two survey. We conducted an experiment in Round Three to determine whether pre-paying physicians who had participated in the last round would increase the likelihood of participation in the current round and reduce the number of calls

[1]Medical societies endorsing the study included the American Medical Association, the American Osteopathic Association, the American Academy of Family Physicians, the American Academy of Pediatrics, the American College of Physicians—American Society of Internal Medicine, the American Psychiatric Association, and the American College of Surgeons.

to complete an interview. Round Two participants selected for the experiment were mailed version two, in which a check for $25 was enclosed, and other Round Two participants were sent version three, which promised the honorarium upon completion of the survey. (The results of the experiment will be included on a forthcoming HSC technical report.)

Additional copies of versions one and two were mailed to physicians who said they had not received them and to those targeted for refusal conversion efforts (one week before the call). Refusal conversion procedures are discussed in Chapter IV.

Copies of the advance materials used for Round Three are in Appendix A.

E. CATI SYSTEM, TELEPHONE MANAGEMENT SYSTEM, AND CASE MANAGEMENT SYSTEM

The CATI instrument was programmed on the SURVENT system. SURVENT interfaces with Gallup's Telephone Management System (TMS), which distributes telephone numbers to each interviewer. For Round Three, the sample was divided into replicates, representing samples of the total sample. Additional replicates were released throughout the field period until target numbers of completed interviews were achieved. The system maintains call histories on every released case to support reports on survey progress and disposition and measures of interviewer productivity. For Round Three, data on call histories from the TMS and data on tracing efforts were combined in a case management system (CMS) that was programmed in Microsoft Access. We used the CMS, which permitted greater flexibility in ad hoc reporting and sample reconciliation, for weekly progress reporting, analyzing interviewer productivity, and tracking sample across various categories throughout the field period (response categories are shown in Chapter IV).

F. INTERVIEWER SELECTION

The CTS Physician Survey was an "executive ownership" study, which means that it was conducted by executive interviewers at Gallup who specialize in interviewing physicians, and other health professionals and business executives. Executive ownership also means that the interviewers "owned" their cases. Interviewers were responsible for setting and keeping their own callback appointments. They therefore had ample opportunity to establish rapport with office workers, as well as with the physicians themselves.

Gallup's executive team for Round Three included interviewers with from 3 to more than 17 years of experience. The members of the executive interviewing team for Round Three included 17 top-producing interviewers who worked on Round Two, supplemented by an additional 14 part-time executive interviewers from other teams to increase staffing flexibility. Altogether, 31 full- and part-time interviewers worked on the Round Three survey. As the field period progressed, we adjusted the number of interviewers to maintain an optimal balance between available sample and productivity.

Although virtually all physicians speak English, some practice receptionists or other office staff prefer Spanish, especially in the Miami site. As in previous rounds, a bilingual interviewer communicated with Spanish-speaking receptionists and other practice staff.

G. INTERVIEWER TRAINING

Although we updated the content of training materials for Round Three to reflect questionnaire modifications, new information, and feedback from pretest interviews, the reference materials provided at the interviewer training session remained consistent with Rounds One and Two. Interviewers received the following documents, which they kept in their carrels when making calls:

1. Physician specialty lists (alpha and numeric for cross-reference)
2. Copies of each of the advance letters
3. HSC Overview
4. HSC Issue Brief #24
5. 9" × 12" flat outgoing RWJ envelope
6. Interviewer's manual

Gallup, HSC, and MPR staff conducted interviewer training on August 15, 2000. The training session on the survey instrument was designed to provide background information on the study, summarize the sample and sample release procedures, review the instrument, and highlight issues that had been discovered during pretesting. The first part of the training sessions focused on the instructions; particularly changes since Round Two. A review of sample design and release procedures also was provided.

Following the reviews, interviewers participated in practice interviews that presented various scenarios. After a final debriefing and discussion at the end of the training session, interviewers conducted additional mock interviews until they were comfortable with the instrument and the information provided during training.

IV. DATA COLLECTION

In this chapter, we describe data collection activities, including staffing, monitoring procedures, tracing activities to locate physicians, efforts to increase response rates, response rate calculations, and data preparation tasks. Overall, we completed 12,406 interviews. The unweighted response rate was 60.5 percent, the weighted response rate 58.6 percent.

A. TELEPHONE CENTER STAFF

In addition to the 31 executive interviewers, Gallup's telephone center assigned four supervisors (including the head supervisor of the Telephone Center) and several support staff. The supervisors monitored interviews, reviewed and resolved problem cases, produced reports, and communicated interviewing problems to HSC and MPR staff.

B. INTERVIEWER MONITORING

The same monitoring procedures were used in Rounds Two and Three. A total of 15 percent of the interviewers' work was monitored by supervisors, who listened to a sample of interview attempts, refusal conversion calls, and full interviews. For full interviews, the supervisors used one of Gallup's standard evaluation forms, which scored interviewers on explaining the survey, reading questions verbatim, recording responses accurately, using objective probing techniques, courtesy, voice quality, and diction. An abbreviated scoring system was used to evaluate interview attempts and refusal conversion attempts. A perfect evaluation score was 50 points, and interviewers were expected to maintain a score of at least 48.

In addition, during weekly sessions, an independent consultant reporting to HSC monitored one or more live interviews conducted by each member of the executive interviewing team.

C. LENGTH OF INTERVIEW

The average length of the Round Three interview was 20.8 minutes, nearly 2 minutes longer than the average survey length of Round Two (19.1 minutes). The average interview length for PCPs during Round Three was 21.7 minutes, while the average for specialists was 20.5 minutes. Compared with Round Two, the interview length for PCPs increased slightly, from 21.2 to 21.7 minutes, whereas the average length for specialists increased from 17.2 to 20.5 minutes. The gap in interview length between the two groups of physicians was reduced because of changes in the design of the instrument, including the deletion of a lengthy section (on clinical vignettes) that had been asked only of PCPs in Rounds One and Two.

D. SPANISH-SPEAKING PHYSICIANS

In sites with sizable Hispanic populations, bilingual interviewers occasionally had to make appointments with Spanish-speaking office workers. However, as in previous rounds, the actual interviews were conducted in English.

E. TRACING

MPR, which was responsible for tracing, conducted two types of tracing activities. In the first phase, we sent cases with missing telephone numbers to a vendor who used directory assistance and telephone matching software to obtain new numbers. Some of these telephone numbers were incorrect, as were some numbers obtained for physicians sampled in prior rounds. In the second phase, we made an intensive effort to obtain telephone numbers to replace the incorrect ones, as well as current numbers of physicians who had changed practices. During the second phase, Gallup transferred cases biweekly from their "Bad Number" file to MPR. We tried to locate telephone numbers and determine eligibility for these cases and returned to Gallup any files that included cases with new telephone numbers, ineligible status codes (retired,

deceased, federal employee, practicing less than 20 hours a week in patient care, resident of fellow, ineligible specialty, or no longer practicing in the U.S.), or a code indicating the physician could not be located. Gallup would then update its sample management system with new telephone numbers and sample disposition codes. This process was repeated iteratively throughout the field period; located telephone numbers found by MPR staff that Gallup interviewers determined were incorrect were returned to MPR for additional tracing.

Tracing staff relied on a broad range of Internet and other sources to find physicians' addresses and telephone numbers. Business numbers were preferred, but staff obtained home numbers when business numbers were not available.

The tracing team followed a six-step procedure:

1. We tried to obtain the social security numbers (SSNs) of physicians in the tracing sample, as SSNs permit links to otherwise unavailable databases. Under our agreement with the AMA, we obtained SSNs only for the purpose of locating physicians for the CTS Physician Survey. We did not access any credit information. If we obtained an SSN, we ran a search, using LexisNexis, to determine the most recent personal address. LexisNexis is a subscription service that accesses various public records databases and provides address updates (and sometimes telephone numbers) as people update their credit file and other public records.
2. If we did not have an SSN, we searched the GTE *Yellow Pages*, under "Physicians & Surgeons," by entering the physician's name and state. If necessary, we searched again in adjacent states, sometimes using Internet map sites as aides.
3. We then searched an online telephone white pages database, using the "People Search" option, by entering first initial, last name, and state (and adjacent states as needed). This was particularly effective for locating physicians with unusual names.
4. The internet locators then checked the AMA's online database [www.docfinder.com] and the following state licensing boards:

Arizona	Arizona Board of Medical Examiners
California	California Medical Board California Board of Podiatric Medicine
Colorado	Colorado State Board of Medical Examiners
Iowa	Iowa Board of Medical Examiners
Kansas	Kansas Board of Healing Arts
Maine	Maine Board of Licensure in Medicine Board

	Maine Board of Osteopathic Licensure
Maryland	Maryland Board of Osteopathic Licensure
Massachusetts	Massachusetts Board of Registration in Medicine
Minnesota	Minnesota Board of Medical Practice
North Carolina	North Carolina Medical Board
Ohio	Ohio Medical Board
Oklahoma	Oklahoma Board of Osteopathic Examiners
Rhode Island	Rhode Island Board of Medical Licensure
Texas	Texas Board of Medical Examiners
Vermont	Vermont Medical Board

If the physician was not listed in one of these states, we defaulted to the state professional licensing databases. The following states had such a database at the time of the survey:

Florida	Florida Health Licensee Search
Connecticut	Connecticut Health Care Professional's License Status
Missouri	Missouri Board of Registration
Georgia	Georgia's Medical Board Physician Database
South Carolina	South Carolina Medical Board
Virginia	Virginia Department of Health Professions
Tennessee	Tennessee Health Care Professions
Oregon	Oregon Board of Medical Examiners
New York	New York State Professional Licensing
Nebraska	Nebraska License Information System

5. If these sources were unsuccessful, we performed additional internet searches, using [www.certifieddoctor.com] or the site of one of the following specialties: American Board of Medical Specialties, American College of Obstetricians and Gynecologists, American Board of Internal Medicine, American Psychiatric Association, Society for Neuroscience, American College of Rheumatology, and the American Psychoanalytic Association.

6. Finally, we used other search features available through LexisNexis, such as White Pages and professional licensing and business listings, to trace physicians we could not locate from other sources.

After they located a physician, tracing staff called the telephone number to verify it. They asked to speak to the physician or someone who could verify the physician's full name and primary specialty. In some cases, we were able to confirm reasons for ineligibility (such as deceased, retired and not practicing, federal employee, or resident).

Tracing results are summarized in Table IV.1. Of the 5,793 physicians in the final sample who were coded as unable to locate or as having been traced by Gallup's case management system or MPR's tracing department, we located 4,204 (72.6 percent). Of those, we were able to complete interviews or verify ineligibility for 65.5 percent. We were slightly more successful in tracing specialists (76.3 percent) than PCPs (71.1 percent). The percentage of physicians interviewed or verified as ineligible also was higher among specialists (68.9 percent) than PCPs (64.1 percent).

F. REFUSAL CONVERSION

The demanding schedules of physicians often make it difficult to schedule and conduct interviews with them. Because efforts to persuade reluctant physicians to participate in surveys can reduce nonresponse and the risk of nonresponse bias, interviewers were trained to coax these "soft refusals" into reconsidering and participating. A physician who was too busy to be interviewed at the time of the initial call, or a receptionist who said that the physician does not participate in surveys, was coded as a soft refusal. Soft refusals often were coded by the interviewers as callbacks rather than refusals, and were retained by the original interviewer who owned the case. In addition, a team of highly skilled "refusal converters" interviewed physicians who were more adamant—those coded as *hard* refusals. A call was coded as a hard refusal when the physician or office worker became hostile and the interviewer believed that a refusal conversion specialist might be more successful. A second soft refusal also was assigned to a refusal converter.

If the physician was too busy during the initial call, the interviewer would emphasize that an interview would be rescheduled at the physician's convenience. If the physician could not be contacted, the interviewer would put the case aside for at least a few weeks and then try again. Postponing the call to a more convenient time often was sufficient to persuade

TABLE IV.1

DISPOSITION OF THE ROUND THREE SAMPLE REQUIRING TRACING

	Total Sample[a]		PCP		Specialist	
Disposition	Tracing Cases	Percent	Tracing Cases	Percent	Tracing Cases	Percent
Total Sample	**5,793**	**100.00**	**4,159**	**100.00**	**1,634**	**100.00**
Completed Eligible	1,813	31.30	1,185	28.49	628	38.43
Total Ineligible	942	16.26	712	17.12	230	14.08
Retired	246	4.25	192	4.62	54	3.30
Deceased	49	0.85	43	1.03	6	0.37
Other ineligible[b]	647	11.17	477	11.47	170	10.40
Located Non-respondent	1,449	25.01	1,061	25.51	388	23.75
Study refusal	695	12.00	508	12.21	187	11.44
Illness/language barrier	4	0.07	3	0.07	1	0.06
No contact/ answering machine	152	2.62	115	2.77	37	2.26
End of study[c]	565	9.75	409	9.83	156	9.55
Other	33	0.57	26	0.63	7	0.43
Unlocatable	1,589	27.43	1,201	28.88	388	23.75

[a]The combined weight is a weighted average of the initial weight for the site and supplemental samples based on the proportion of the total sample from each of them (90.6 percent for the site sample and 9.4 percent for the supplemental sample).

[b]Other ineligible include federal employee, practicing less than 20 hours/week in patient care, resident or fellow, ineligible specialty, or no longer practicing in U.S.

[c]Physician was contacted but did not respond with a hard refusal. This category may include “soft” refusals, which were coded as callbacks.

the physician to complete the interview. If a receptionist or other staff member acted as a gatekeeper, the interviewer would call again when that person was likely to be out of the office. In those cases, a different office worker might answer and transmit the call to the physician, or the physician might answer personally and be able to complete the interview.

Often, receptionists or other office staff refuse for physicians, so the physician may not have been aware of the call. In cases where the physician may have refused because he or she was extremely busy at the moment, the refusal was allowed to age three or four months. The refusal conversion specialist would then prepare for the interview by reviewing notes about prior interactions, which the original interviewer had recorded in the CATI system. The notes enabled the specialist to prepare responses to previously expressed concerns. To prepare for the refusal converter's approach, we mailed or faxed the physician another copy of the introductory letter but did not acknowledge the previous refusal.

Round Three rules used to determine whether a case would be assigned to the refusal conversion team and the level of effort expended on these cases were consistent with Round Two. Our goal was to maintain a balance between efforts to reduce nonresponse and the need to complete the survey in a reasonable time, and to avoid harassing physicians who clearly did not wish to participate. Although no limit was placed on call attempts, we agreed that a case given to the refusal conversion team (in other words, a case that had received one hard or two soft refusals) would result in a disposition of a final refusal after one additional physician refusal or two additional gatekeeper refusals.

The Gallup refusal conversion team that was assigned hard refusals and second soft refusals for Round Three consisted of 10 executive interviewers skilled in coaxing receptionists and other gatekeepers to transfer calls to physicians and in fluently addressing physicians' concerns about survey participation, such as burden, sponsorship, study purpose, or data confidentiality.

For Round Three, a total of 3,683 original refusals (15 percent of all released cases) were sent to the refusal conversion team, which converted 554 (15 percent) to completed interviews.

G. RESPONDENT INCENTIVES

For the first two rounds of the physician survey, eligible physicians were offered $25 honoraria for participation and mailed checks after completing the survey. The incentive was designed to demonstrate commitment rather than to compensate physicians for their time. We promised the honoraria to physicians who completed the survey rather than mailing checks prior to the initial call because of uncertainty concerning the benefits and costs of mailing checks prior to participation. Many physicians sampled for the first time have incorrect addresses and approximately 15 percent are not eligible.

We reconsidered this decision for the Round Three panel component because eligibility and participation were likely to be high for this group and we had information from the last survey on current addresses, which reduced financial risk. Our objective in testing prepayment was to increase response rates and reduce cost. Interviewing costs for prepaid physicians would be less than for physicians promised payment if fewer calls were needed to complete interviews. On the other hand, some physicians mailed checks prior to the interviewer's first call may cash them without completing an interview, increasing the cost of prepayment.

Physicians participating in the experiment were randomized to either prepayment or promised payment. Physicians in the prepayment group were mailed a separate letter (see Appendix A) that referred to the honorarium, and those in the promised payment group received the same letter as other physicians offered the honoraria after completing the interview. Results of the experiment will be placed on the HSC Web site as a separate technical report.

Physicians who were not selected for the experiment were mailed $25 checks after completing the interview, as in prior rounds of the survey.

H. SAMPLE DISPOSITION AND RESPONSE RATES

Table IV.2 shows the disposition of the Round Three sample. Overall, 47.9 percent of the weighted population count were completed interviews, 10.7 percent were ineligible, 35.6 percent were located nonrespondents, and 5.8 percent could not be located. These estimates are very similar to Round Two (Potter et al. 2001, Table IV.4), in which 48.7 percent of the weighted population count were completed interviews, 11.4 percent were ineligible, 32.2 percent were located nonrespondents, and 7.8 percent were not located. The main difference between the two rounds was a decrease in the percentage that could not be located and an increase in located nonrespondents. This suggests that Round Three tracing efforts resulted in more physicians being located than in Round Two but did not result in a higher response rate.

Among the 32.2 percent of located nonrespondents, slightly more than half refused to complete the interview (16.4 percent) or indicated on the AMA Masterfile that they did not wish to be interviewed (1.7 percent). The other major sources of nonresponse were (1) physicians who had been contacted but had not been coded as a refusal by the end of the data collection (11.5 percent in the "end of study" category), and (2) no contact or answering machine (3.1 percent). Some of the physicians in the "end of the study" category may have been "soft refusals" that were not coded as refusals by interviewers. In any case, repeated callbacks and broken appointments often indicate lack of interest in survey participation and have the same effect as refusals. The remaining 0.5 percent of nonrespondents were ill, had language problems, or received other codes.

TABLE IV.2

RESPONSE RATE CALCULATIONS FOR ROUND THREE

Disposition	Total Sample[a]				PCP				Specialist			
	Released Sample	Unweighted Percent	Initial Weighted Count	Weighted Percent	Released Sample	Unweighted Percent	Initial Weighted Count	Weighted Percent	Released Sample	Unweighted Percent	Initial Weighted Count	Weighted Percent
Total Sample	**24,940**	**100.00**	**482,665**	**100.00**	**16,176**	**100.00**	**194,063**	**100.00**	**8,764**	**100.00**	**288,602**	**100.00**
Completed Eligible	12,406	49.8	230,971	47.9	7,673	47.1	89,436	46.1	4,733	54.0	141,535	49.0
Total Ineligible	2,660	10.7	51,789	10.7	1,847	11.4	21,973	11.3	813	9.3	29,816	10.3
Retired	602	2.4	12,051	2.5	414	2.6	4,835	2.5	188	2.1	7,216	2.5
Deceased	109	0.4	1,584	0.3	91	0.6	968	0.5	18	0.2	616	0.2
Other ineligible[b]	1,949	7.8	38,154	7.9	1,342	8.3	16,170	8.3	607	6.9	21,984	7.6
Located Non-respondent	8,285	33.2	171,750	35.6	5,455	33.7	68,136	35.1	2,830	32.3	103,613	35.9
AMA refusal[c]	424	1.7	8,319	1.7	312	1.9	4,318	2.2	112	1.2	4,001	1.4
Study refusal	4,084	16.4	89,530	18.6	2,685	16.6	34,751	17.9	1,399	16.0	54,780	19.0
Illness/language barrier	34	0.1	598	0.1	25	0.2	255	0.1	9	0.1	344	0.1
No contact/ answering machine	768	3.1	14,680	3.0	471	2.9	5,612	2.9	297	3.4	9,068	3.1
End of study[d]	2,879	11.5	57,020	11.8	1,886	11.7	22,260	11.5	993	11.3	34,760	12.0
Other	96	0.4	1,602	0.3	76	0.5	941	0.5	20	0.2	661	0.2
Unlocatable	1,589	6.4	28,155	5.8	1,201	7.4	14,517	7.5	388	4.4	13,638	4.7

[a]The combined weight is a weighted average of the initial weight for the site and supplemental samples based on the proportion of the total sample from each of them (90.6 percent for the site sample and 9.4 percent for the supplemental sample).

[b]Other ineligible include federal employee, practicing less than 20 hours/week in patient care, resident or fellow, ineligible specialty, or no longer practicing in U.S.

[c]Physician notified AMA that he or she did not want to be contacted for any surveys; if sampled, their cases were not contacted but included as nonresponses.

[d]Physician was contacted but did not respond with a hard refusal. This category may include “soft” refusals, which were coded as callbacks.

The response rate is the proportion of eligible cases providing completed interviews. However, we were not able to determine eligibility for nonrespondents and unlocated physicians. For Rounds One and Two, we estimated the eligibility rate differently for nonrespondents and unlocated physicians. We assumed that eligibility for nonrespondents was the same as for respondents, but imputed a lower eligibility rate for unlocated physicians, based on a small study conducted in Round One. For that round, we carried out in-depth tracing of 400 sample cases who were not located through the usual procedures. The eligibility rate for traced physicians was 62.9 percent, significantly lower than that of contacted physicians in the regular sample (Potter et al. 2001, Chapter IV).

However, we had some concern about the stability of that estimate overtime and did not have the resources to conduct a similar study for Round Three. Moreover, we reduced the fraction of the sample that were unlocated in Round Three, so the impact of a differential eligibility rate would be smaller. Consequently, we applied the same eligibility rate to both located nonrespondents and unlocated physicians in Round Three. We computed the response rate simply as the ratio of the sum of completed eligible and ineligible physicians to the total released sample.

For Round Three, the unweighted response rate was 60.5 percent and the weighted rate was 58.6 percent. Applying the Round Three response rate procedure to Round Two, we get an unweighted Round Two response rate of 59.8 percent and a weighted one of 60.1 percent, so the change between rounds was negligible.[1]

[1]Note that the reported Round Two response rates, which were based upon a procedure where a lower eligibility rate was assigned to unlocated physicians, was 60.9 percent unweighted and 61.1 percent weighted. So the procedure used in Round Two increased the response rate by approximately 1 percentage point.

For PCPs, the respective Round Three unweighted and weighted response rates were 58.5 percent and 57.4 percent, and for specialists, 63.3 percent and 59.3 percent. These patterns also are similar to those of prior rounds (Potter et al. 2001, Chapter IV).

Sample dispositions varied considerably by stratum (Table IV.3); key findings are summarized below.

1. ***Round Two Completed Interviews.*** Approximately three-fourths (74.8 percent) of the physicians who completed Round Two interviews and were sampled for Round Three completed Round Three interviews; 5.9 percent were ineligible, 17.5 percent did not respond, and only 1.7 percent could not be located.

2. ***Round Two Ineligible Interviews.*** Although about half the sampled Round Two ineligible physicians (49.2 percent) were again ineligible for Round Three, 13.9 percent were now eligible and completed interviews, 28.2 percent did not respond, and 8.7 percent could not be located.

3. ***Round Two Located Nonrespondents.*** We completed interviews with 23.1 percent of the sampled Round Two nonrespondents and verified that 7.1 percent were ineligible. About two-thirds (67.8 percent) were again nonrespondents, and only 2.9 percent could not be located.

4. ***Round Two Not Located.*** We were very successful in locating physicians in Round Three who could not be traced in Round Two, completing interviews with 24.9 percent, determining that 13.7 percent were ineligible, and coding 22.7 percent as nonrespondents. Only 38.7 percent of the Round Two unlocated physicians could not be located for Round Three.

5. ***Round Two Not Sampled.*** Among physicians who were on the Round Two sample frame but were not sampled until Round Three, 33.1 percent were interviewed, 15.4 percent were ineligible, 45.2 percent were nonrespondents, and 6.3 percent could not be located.

6. ***Round Three New Frame.*** Physicians who were new to the frame for Round Three were more likely to respond than Round Two physicians who were not sampled (group 5), but they were more difficult to locate. This may have been related to their demographic characteristics, since physicians who were new to the AMA Masterfile would be younger and more likely to be female than those who were on the frame for prior rounds. We completed interviews with 38.1 percent of this group, and coded 16.7 percent as ineligible, 33.4 percent as nonrespondents, and 11.9 percent as unlocated.

TABLE IV.3

DISPOSITION OF ROUND THREE SAMPLE, BY SAMPLE TYPE AND SAMPLING CLASSES

		Disposition of Round Three Sample							
		Complete		Ineligible		Located Nonresponse		Not Located	
Sample Type and Stratum	Cases Released	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Total Sample									
From Round Two Frame									
Complete	11,394	8,527	74.8	672	5.9	1,996	17.5	199	1.7
Ineligible	859	119	13.9	423	49.2	242	28.2	75	8.7
Located nonrespondent	5,140	1,137	23.1	366	7.1	3,486	67.8	151	2.9
Not located	1,316	328	24.9	180	13.7	299	22.7	509	38.7
Not sampled	1,539	509	33.1	237	15.4	696	45.2	97	6.3
Round Three New Frame	4,692	1,786	38.1	782	16.7	1,566	33.4	558	11.9
Total	**24,940**	**12,406**	**49.7**	**2,660**	**10.7**	**8,285**	**33.2**	**1,589**	**6.4**
Site Sample									
From Round Two Frame									
Complete	10,345	7,723	74.7	618	6.0	1,819	17.6	185	1.8
Ineligible	787	112	14.2	385	48.9	218	27.7	72	9.1
Located nonrespondent	4,688	1,040	22.2	335	7.1	3,174	67.7	139	3.0
Not located	1,207	297	24.6	163	13.5	275	22.8	472	39.1
Not sampled	1,332	428	32.1	211	15.8	604	45.3	89	6.7
Round Three New Frame	4,229	1,638	38.7	716	16.9	1,373	32.5	502	11.9
Total	**22,588**	**11,238**	**49.8**	**2,428**	**10.7**	**7,463**	**33.0**	**1,459**	**6.5**
Supplemental Sample									
From Round Two Frame									
Complete	1,049	804	76.6	54	5.1	177	16.9	14	1.3
Ineligible	72	7	9.7	38	52.8	24	33.3	3	4.2
Located nonrespondent	452	97	21.5	31	6.9	312	69.0	12	2.7
Not located	109	31	28.4	17	15.6	24	22.0	37	33.9
Not sampled	207	81	39.1	26	12.6	92	44.4	8	3.9
Round Three New Frame	463	148	32.0	66	14.3	193	41.7	56	12.1
Total	**2,352**	**1,168**	**49.7**	**232**	**9.9**	**822**	**34.9**	**130**	**6.5**

Response patterns for the site and supplemental samples are generally similar. Appendix C presents additional data on differences between respondents and nonrespondents..

J. DATA PREPARATION

Most of the data coding and cleaning was done by the CATI system. As the interviewers entered response option codes selected by the respondents, these numbers were written to a data file. The CATI system was programmed to conduct range and consistency checks, and to prompt the interviewer when an impossible or unlikely response was entered. The interviewer could then correct the data entry or ask the respondent to clarify the answer.

1. Range Checks

The ranges of most closed-ended items in a CATI survey are determined by codes for the available responses. For example, a "Yes/No" variable offers the following codes:

1 = Yes

2 = No

8 = Don't know

9 = Refused

If the interviewer mistakenly attempts to enter a code of "3," the CATI system will reject it as an unacceptable code. The interviewer can then enter the correct one.

Some items, such as dates, number of hours worked, or percentages of revenue, do not have a set of preassigned response codes. Ranges are bounded by what is possible. For example, values greater than 100 percent are not accepted for questions requesting percentages of revenue.

2. Consistency Checks

Consistency or logic checks examine the relationships between two or more variables to be sure that the responses do not conflict with one another. A few such checks were contained in the CATI program. For example, question B2 asks the physician how many hours he or she spent in all medically related activities in the past week. Question B3 then asks how many hours were spent in direct patient care that week. If the responses to these two questions are equal, a verification question is asked to ascertain that all the physician's time was spent in direct patient care. Alternatively, if the physician indicated having spent more hours in direct patient care than in all medically related activities (a logical impossibility), the physician was prompted to revise one or both of the answers to questions B2 and B3.

Section G of the questionnaire includes consistency checks related to practice revenue, which resulted in interviewer prompts. The checks are summarized here; any of the following conditions resulted in an error message to the interviewer:

1. The combined practice revenue from Medicare and Medicaid (and other state sponsored health plans) is greater than 100 percent.
2. The percentage of practice revenue from all managed care contracts is less than the percentage received on a capitated basis.
3. All the practice's managed care revenue is paid on a prepaid basis.

3. Data Cleaning

Although most data cleaning for a CATI survey is done online, a few data-cleaning steps must be completed after the survey leaves the field. Frequencies are examined and cross-tabulations are run to check for additional consistency checks that were not built into the survey. On the basis of these tabulations, data may be changed or flagged for further checking.

4. Coding

As in the first two rounds, only an extremely limited amount of postinterview coding was conducted for Round Three. Four questions in Section C permitted entry of "other—list" responses (questions C2, C3c, C6, and C6a) for which the interviewer was to type in any answer that was not provided as a coded response option. Open-ended responses obtained for these questions were examined to determine whether the responses fit any of the categories provided in the question. If they did not, no change was made. If they did, the response the interviewer entered was recoded to the correct response category. A few response categories were added to permit coding of most of the "other-- list" responses.

5. Location Coding Review

Physicians in the site sample were sampled as part of the population of a particular site, and each site was defined as containing a particular set of Federal Information Processing System (FIPS) codes. During the interview, every respondent was asked to confirm the county and state where his or her primary practice was located. Respondents whose practices were not in the county and state shown in the sample record were asked to provide their current county and state.

County and state names were matched against a list containing all the FIPS codes in the country to determine the FIPS code of each physician's current location. We then compared

these NEWFIPS codes with the FIPS codes in the sample record to determine whether the physician's site had changed since sampling. The following variables were provided in a separate file to document the site locations of physicians who moved between the time of sampling and the time of the interview:

OLDSITE— The site where sampled. It was "0" for all supplemental sample cases and "1–60" for the site sample cases.

NEWSITE— The site where the physician was located when interviewed. To determine the NEWSITE, we converted the verbatim county and state information to FIPS codes (NEWFIPS) and then matched those against a file that identified whether the code fell into one of the 60 sites or was outside them. If outside the 60 sites, it was coded as site 61. We used "0" to identify physicians who were in the supplemental sample and outside of the 60 sites.. We added codes 98 and 99 to indicate, respectively, "DK/Refused on the county question" (A5a) and "no match found on state/county when compared with the database."

OLDFIPS— The FIPS code provided by the AMA or AOA Masterfiles at the time of sampling.

NEWFIPS— The FIPS code of the county in which the physician was located when interviewed. These codes were determined by matching the verbatim county and state responses against a file that contains all FIPS codes in the United States.

LOCCODE— 1 = Respondent remains in the same site where sampled (sites 1–60).

2 = Respondent was sampled in one site but moved to a different site. Supplemental respondents (all sampled as part of site 0) were located within a particular site when sampled but had moved to a different site at the time of interview.

3 = Respondent was sampled in the site sample but had moved outside the 60 sites (site 61).

4 = Respondent was sampled in the site sample but had moved to a new location, which was unknown.

5 = Respondent was sampled in the supplemental sample (site 0) and remained within the same site location as at the time of sampling (either sites 1–60 or site 61, outside the 60 sites).

STRATCHG—Applied only to cases in the supplemental sample, although "0" was used as a placeholder for site sample cases. By comparing the state where sampled with the state names in question A5a, we determined whether these cases were in the same stratum as when sampled or in a different stratum.

1 = Respondent remained in the same stratum where sampled.

2 = Respondent moved to a different stratum.

3 = Respondent moved to a new, unknown location, stratum unknown.

OLDSITE— For cases sampled in the supplemental sample, SMPSITE is the site in which the case would have been selected if it had been part of the site sample (sites 1–60). If a supplemental case had not been selected in any of the 60 sites, the SMPSITE value was 61. SMPSITE was used to create the LOCCODE variable.

STCNTY— This field was added to the final Round Two locator database; it contains the two-letter state code linked with the county name that was given by the respondent.

V. SAMPLING AND ANALYSIS WEIGHTS

A. OVERVIEW

We distinguish between *sampling* weights and *analysis* weights. Sampling weights are calculated from the selection probabilities. Sampling units at each sampling stage have known probabilities of being selected, and the sampling weights equal the reciprocal of the product of these probabilities. We could have used sampling weights alone for our analyses if all the frame definitions had been correct, and if every eligible physician in the sample had been located and had completed a survey questionnaire. However, some of the frame definitions (for example, geographic and physician specialty coding) were incorrect; some physicians could not be located, and others did not participate. We therefore had to modify the sampling weights to account for errors in the sample frame and for nonresponse. To produce valid study results, we had to use modified weights, which we refer to as *analysis* weights. Furthermore, because we use two samples (the site sample and the supplemental sample) in each study round and are interested in several different analysis objectives, several sets of both the sampling weights and analysis weights have been calculated.

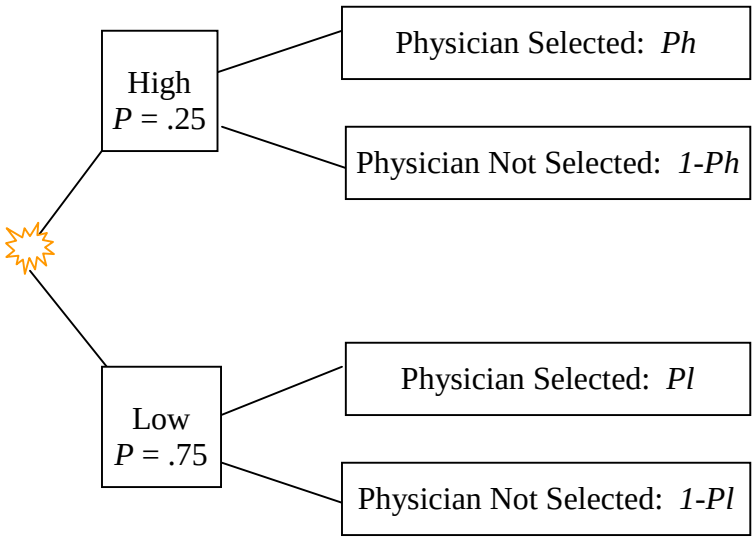
Finally, because we select from physicians sampled in the prior round varying sampling rates by previous survey outcomes can increase efficiency, but it also increases the complexity of constructing the weights. For example, selection of sample from the prior round to meet sample size requirements increased the number of paths by which a physician could be selected into the current sample and probability factors needed to calculate weights.

The objectives of the study and planned analyses (Chapter II) affect the calculation and use of the sampling and analysis weights. In the following sections, we describe these features and the weighting implications.

1. High-Intensity Sites

Of the 48 sites selected from MSAs with 200,000 or more population (in July 1992), 12 were randomly assigned as high-intensity sites and 36 as low-intensity sites (see Table I.1). Each of the 48 sites had a 25 percent chance of being assigned as a high-intensity site. (The 12 other sites, which are smaller MSAs and nonmetropolitan sites, did not have a chance of being selected as a high-intensity site.) This random assignment influenced the probability of selection for a physician practicing in one of the 48 sites. That is, a physician could be selected with one of two different sampling rates, depending on whether the physician's practice was assigned to a high- or low-intensity site.

We can view this situation as being analogous to an experiment with four possible outcomes:



Each physician practicing in a site could follow one of the four paths. *Ph* and *Pl* are conditional probabilities that equal the probability of the physician being selected for the survey if his or her practice was in a high-intensity (*Ph*) or low-intensity (*Pl*) site, respectively. The probability of any one of the four outcomes is equal to the product of the branching probabilities at each node along the path to that outcome. Note that the selection of a particular physician at

that site coincides with two of the four outcomes. Hence, the probability of a physician being selected for the Round One study equaled the probability of selecting his or her site of practice multiplied by the sum of the probabilities for those two outcomes.

This basic concept can be extended to deal with the increased complexities of the probabilities associated with the prior and current rounds in this study. The number of paths is simply increased to account for selection in any one of the previous survey rounds and several categories of prior survey outcomes for a particular physician.

To compute the selection probability for a physician, we had to calculate two conditional probabilities, one for each path. To compute the conditional probabilities for the path to which the physician did not get assigned, we calculated the conditional probabilities using the sample allocation rules that would have been used for the alternative path. In Appendix B, we describe the full set of conditional probabilities; the probabilities for the paths that were not selected were called *alternative* probabilities.

2. Competing Objectives

Several sets of analysis weights were developed for Round Three, reflecting the study's analytic objectives (see Table V.1). We will use the site sample in the high-intensity sites to support site-level analyses for high-intensity sites. Combined with the low-intensity sites, both sets together comprised a valid national sample. We developed different site sample weights for site- and national-level analyses, because the weights that were efficient for national analyses were not suitable for site analyses. Simply multiplying analysis weights for site-level estimates by the site-level weight would produce valid national estimates, but with large variances because of variation in the sample sizes of high- and low-intensity sites.

The supplemental sample was used to develop more efficient national-level estimates, unhampered by cluster sampling and the need to deal with geographic misclassification. The

TABLE V.1

SUMMARY OF ANALYSIS WEIGHTS

Type of Estimate	Sample	Weight Names[a]	Records With Completed Interviews[a]			Comments
		Round Three	Round One	Round Two	Round Three	
Site-Specific	Site sample (practice in 60 sites)	*PHYWGT1*	10,881	10,434	10,136	Does not include additional cases from the supplemental sample
	Augmented site sample	*PHYWGT5 (WTPHY1)*	11,456	10,920	10,659	Best option for site-specific estimates, because site samples include additional cases from the supplemental sample
National	Site sample (all)	*PHYWGT2*	11,310	11,216	11,238	Does not include additional cases from the supplemental sample
	Supplemental sample	*PHYWGT4 (WTPHY3)*	1,218	1,088	1,168	Unclustered design, minimal design effect
	Augmented site sample	*PHYWGT7* (WTPHY5)	n.a.	10,920	10,659	Best option for national estimates when using site-level variables in analysis, because it includes additional cases from the supplemental sample
	Combined sample	*PHNATWT1 (WTPHY4)*	12,528	12,304	12,406	Best option for most national estimates, because it uses all cases from site and supplemental samples
National Panel	Combined sample	*PAN23WTC (WTPAN1)*	n.a.	7,092	8,527	Includes only those physicians interviewed in both Round Two and Round Three
	Site sample (all)	*PAN23WT1 (WTPAN2)*	n.a.	6,569	7,723	

[a]Name in parentheses refers to variable name on the Public Use File and Restricted Use File.

[b]Some physicians were sampled for both the site and the supplemental samples and are included in each sample, although they were interviewed only once. There were 143 physicians included in both samples for Round One, 24 for Round Two, and 17 in Round Three.

weights for this sample did not relate to whether physicians practice within one of the survey sites. Supplemental sample weights would produce site-level estimates for some of the sites, but the sample sizes would be inadequate (that is, the estimates would have insufficient precision).

Several sets of weights were designed to use the two samples in combination to produce the most accurate estimates both for the individual sites and nationally. We calculated all the weights separately for the two physician specialty categories (primary care physicians [PCPs] and specialists). Although the equations are the same, the sampling rates differed and reflected the desire to oversample PCPs.

Some of the national-level analyses used site-specific information. Hence, separate sets of national weights were developed that excluded physicians practicing outside the 60 sample sites.

Finally, for longitudinal analyses, we designed panel weights to permit analyses of individual changes for physicians who responded to both Round Two and Round Three. These longitudinal analyses can use a model such as the following:

(1) $Y_{ij} = B_C X_{i(j-1)} + B_L (X_{ij} - X_{i(j-1)}) + e_{ij}$

where Y_{ij} denotes the observed data for the *i*th physician at time *j*, $X_{i(j-1)}$ denotes the value of the independent variable at time *j-1* for the *i*th physician, B_C denotes the coefficient estimate at time *j-1*, X_{ij} denotes the value of the independent variable at time *j* for the *i*th physician, B_L denotes the coefficient estimate of the change between time *j* and time *j-1*, and e_{ij} is the random-error term. The first two terms on the right side of the equation are the cross-sectional and the longitudinal terms, respectively, for subject *i* at time *j* (Diggle et al. 1999).

3. Focus on Primary Care

PCPs were sampled at approximately twice the rate as specialists to produce the desired precision for these physicians. The different sampling rates for PCPs and specialists in the site sample resulted in unequal weights and, hence, reduced the survey precision for estimates for all physicians who had patient contact. Because of this disproportionate sampling, we designated the two physician categories as strata to control sample sizes and used the physician specialty as a characteristic for the nonresponse adjustments. Prior to sample selection and interviewing, we classified physicians as PCPs or specialists based on the sampling frame information from AOA and AMA (for physicians who had not previously been interviewed) or on the Round Two survey response (for those who completed Round Two interviews). During the Round Three survey, some of the physicians were reclassified based on information provided by survey responses. However, sample weights had to ensure that they retained their initial probability of selection, even if they changed specialty classification based on interview data. (See Chapter II for a detailed discussion of this problem.)

4. Supplemental Sample

The supplemental, unclustered national sample was used to improve the precision of national estimates, because the clustering and different sampling rates in the site sample reduced the precision for national estimates from that source. The site and supplemental sample designs were quite different and required different equations for calculating weights. Therefore, using the two samples in combination in various ways required several different sets of weights (for example, augmented sample estimates and combined national-level estimates).

5. Geographic Misclassification (Movers)

Physicians in the site sample were to be assigned to the site containing their practice. However, information available at the time of sample selection did not always identify whether the practice was in one of the 60 sites; the information available may have been the physician's home address. Because practice site was an important analysis domain, some physicians were reassigned to a site other than the one assigned at sample selection; the practice site was not known with certainty until the interview (also discussed in Chapter II).

To compute the weights for the site specific estimates, physicians were assigned to sites where their practice is. Reassignment to practice sites resulted in unequal weighting and complicated the equations used to compute the weights, because physicians selected from one sampled site who practiced in another sampled site must reflect probabilities associated with both sites (referred to as *joint inclusion* probabilities). The sampling weight for these cases therefore sometimes differed substantially from the weight for the other physicians practicing in the same site.[1]

6. Longitudinal Versus Cross-Sectional Estimates

Because the CTS has a longitudinal component, the Round Three sample can be used to provide both efficient cross-sectional and change estimates. As discussed in Chapter II, the sample included physicians interviewed in the prior round to improve the precision of change estimates and can be used to improve cross-sectional (point-in-time) estimates.

[1]Extremely large weights can be trimmed to improve the precision for site-level estimates. However, to avoid introducing significant bias into the survey estimates, we minimized weight trimming.

Weighting for surveys with a longitudinal component is complex, because the inclusion probabilities are defined not only on the current conditional selection probabilities, but also partly on the selection of physicians in the prior rounds and the number of times the physicians are selected for additional rounds. Finally, weights for the panel of reinterviewed physicians required adjustments so that they related to the same reference population (that is, the weights for Round Three panel respondents were scaled to the population distribution of Round Two).

7. Analysis Weights

Unbiased estimates are the goal of any survey. However, some of the physicians sampled for the CTS Physician Survey could not be located, and others refused to participate or did not respond to repeated calls. Using logistic regression models based on data available from the sampling frames (for all physicians) and from the prior round (for reinterviewed physicians), we developed adjustments to the sampling weights for these physicians to reduce the potential for bias by compensating for the physicians who could not be located and for nonresponses among those we did locate. We refer to these weights as the *analysis* weights. We developed separate multivariate models to adjust the weights for unlocated and nonresponding physicians in the sample.

8. Weights Used

The limitations of the sample frames (for example, missing or incorrect information from the AMA and AOA files) and the need to use unequal sampling rates both influenced and complicated the calculation of sampling and analysis weights. In addition, the analytic objectives required the calculation of several sets of analysis weights. The various weights include those needed for:

- National-level estimates for the site sample, supplemental sample, augmented site sample, and combined sample (using both site and supplemental samples)
- Site-level estimates from site and augmented samples
- National panel analyses from site and combined samples

Table V.1 summarizes the weights and their uses.

B. COMPUTATIONAL METHODS

1. Overview

The sampling and analysis weights had one component in common—the weight was calculated as the reciprocal of the inclusion probability of the physician. For the site sample, this weight was based on the site weight and one or more conditional weights (based on reciprocal selection probabilities). As Table V.1 shows, we computed several sets of weights to serve different analytic objectives. Because the equations for each weight were complex, we present only a few examples here. The process for adjusting the sampling weights to account for unlocated physicians and nonresponse was complex and included nonresponse adjustments (including separate treatment of unlocated physicians and nonresponding physicians who were located), poststratification, and weight trimming.

2. Probability of Selection

Sampling weights were essential both for calculating unbiased statistics from the survey data and for conducting valid analyses. To compute the weights, we had to calculate the inclusion probabilities for each record on the data file.

As noted, the entire site sample, including movers, was used to develop weights for national estimates. The site sample was a two-stage probability sample drawn from the national frame (that is, from the population of all physicians in the defined target population). For national estimates, the calculation of the inclusion probability (P_i) for any sampled physician accounted

for the selection probability of the site, the random assignment of a site as either a high- or a low-intensity study site, and the selection probability of the physician in the site.

To illustrate, for the Round One sample, the probability of selection (P_i) of a physician sampled within a site was calculated according to the following equation:

(2) $P_i = P(site)*P(i|site)$

$= P(site)*[P(HI)(n_{HI}/ N_s) + (1 - P(HI))(n_{LO}/N_s)]$,

where N_s was the sampling frame size, $P(HI) = 12/48 = 1/4$ for the 48 large metropolitan sites and = 0 for the other sites, and n_{HI} (n_{LO}) was the sample size that would have been allocated to a site if it was chosen as a high- (low-)intensity site. To use equation (2), we had to estimate the sample size that would have been released under our original sample allocation plan, treating each site first as a high-intensity one and then as a low-intensity one. The process was required for each of the four sampling strata used in Round One of the study (PCP or specialist by frame source [AMA or AOA]) within each of the 48 large metropolitan sites. For Round Three we used the same strategy to estimate the sample size for each stratum (8 sampling groups: Round Two reinterviews, Round Two noninterviews, in the frame but not selected in the Round Two, and new in the Round Three frame for PCPs and specialists) in Rounds Two and Three.

For the Round One supplemental sample, the calculation of the probabilities for the basic weight was a simpler single-stage process. We used the same strategy to calculate inclusion probabilities for Rounds Two and Three, except that we defined more sampling groups in each site or supplement sample stratum. We also had to account for the fact that a physician could have been selected in Round One, Two, or Three or in some combination of these.

At this point, we ignore the issue of physicians whose geographic or patient care classification was misassigned by the frame. (This is discussed in Appendix B.) In this

example, we also ignore the fact that large MSA sites were randomly assigned as high- or low-intensity sites in order to simplify the discussion. In Round Two and subsequent rounds, these calculations must also reflect probabilities and response status relating to previous points in time.

Consider that a physician could be selected for Round Three via several paths, which were used to develop four sampling groups:

1. Physician was eligible and completed a Round Two interview. The path includes a Round Two eligible *complete* that (a) could have or could not have been selected at Round One (if selected at Round One, they may have been either a noninterview or interview), or (b) could have been new on the Round Two frame
2. Physician was selected in Round Two but did not complete the interview, for example, was ineligible, could not be located, or refused (a Round Two *noninterview;* same alternate paths as described for sampling group one)
3. Physician was not selected in Round Two but was in the Round Two frame (an *old*-frame physician; same alternate paths as described for sampling group one)
4. Physician was not in the Round Two frame (a *new*-frame physician)

If we consider the chain of events for the Round Two physicians selected from the Round One population, we have two possible routes, *a* (was selected in the Round One sample), and *b* (was not selected in the Round One sample):

(3) $P(a) = P_{site} * P_{11} * P_{2j}$

and

(4) $P(b) = P_{site} * (1 - P_{11}) * P_{23}$,

where:

P_{site} = the (unconditional) probability of selecting the site.

The conditional probabilities are defined as P_{ij}, i relates to Round One (i = 1), Round Two (i = 2), or Round Three (i = 3), and j relates to the frame sampling groups 1 to 4 for PCPs (and 5 to 8 for specialists, reflecting the different selection probabilities of PCPs and specialists).

P_{1k} = the conditional probability of selecting the physician in Round One given the site was selected. For PCP, k = 1; and for specialist, k = 2.

P_{2j} = the conditional probability of selecting the physician in Round Two given the physician was a respondent in the Round One sample (j = 1 or 5), or the physician was not a respondent in Round One sample (j = 2 or 6), or the physician was not selected in Round One (but was in the Round One frame) (j = 3 or 7).

The inclusion probability for Round Two, P, equals the sum of probabilities for occurrence in one or the other of two disjoint events. That is, $P = P_{site}*\{P_{1k}*P_{2j}+(1-P_{1k})*P_{23}\}$, *where* j *= 1, 2, 5, or 6.* The probability for a new physician (not on the Round One frame) is simpler because of the shorter path. Conversely, while the basic process is the same, the probability for a physician selected in Round Three is more involved, because the path can be longer. Consider, for example, a physician who was selected in Round One, not selected in Round Two, but selected again in Round Three. The probability for Round Three is a function of the current probabilities as well as those in all prior rounds.

Clearly, one can use different assumptions to calculate the basic sampling weights in longitudinal surveys. The method used in Rounds Two and Three is a slight variation of the method shown here. The alternatives that were considered produce unbiased estimates subject to some reasonable assumptions. In addition, the resulting variances are similar. The full equations used to calculate the Round Two weights are in Appendix B. Because of the numerous pathways involved, the equations for subsequent rounds are not presented, but they can be generalized from the Round Two equations.

C. LOGISTIC PROPENSITY MODELS FOR NONRESPONSE ADJUSTMENTS

The purpose of nonresponse adjustment to sampling weights is to reduce the potential for bias associated with nonresponse. If nonresponse to a survey is completely random, then weighted estimates of means using sampling weights would be unbiased, and nonresponse adjustment would not be required. For estimating totals, however, we would still need a single adjustment to inflate a weighted total to account for the proportion of physicians who did not respond. However, nonresponse is rarely completely random, and it is possible to ascertain patterns about characteristics of sampled people, such as physicians, who do or do not respond.

For the CTS Physician Survey, the concept underlying nonresponse adjustments is to develop two types of logistic regression models, which can predict (1) the probability of locating a physician (location propensity score), and (2) the probability of that physician's completing the interview (response propensity score). We computed an adjustment value for each physician who completed the interview or was determined to be ineligible for the survey. The adjusted weight for nonresponse is simply the product of the inverse of the location propensity score, the inverse of the response propensity score, and the sampling weights (sometimes referred to as the nonresponse-adjusted or analysis weights).

A key determinant in developing the logistic regression models is the availability of information for respondents and nonrespondents. In many surveys, limited information is available beyond that used for creating sampling strata. However, we have considerable information from the sampling frames and the Round Two survey that can be used to adjust for nonresponse to the Physician Survey. For nearly all sampled physicians, demographic and practice characteristics are available from the AMA and AOA files that were used as the sample frame. We also have an extensive array of variables from the Round Two survey for Round Three physicians interviewed in the prior survey. In addition, for nonrespondents and unlocated

physicians in Round Two that were selected for Round Three, we have data on survey disposition for Round Two.

Logistic propensity modeling has been used for surveys where information on the characteristics of both respondents and nonrespondents is available. For example, this approach was used for the National Survey of Family Growth (Potter et al. 1998) and has been tested for use with the Survey of Income and Program Participation (Folsom and Witt 1994). The procedure also has been used in surveys of military personnel (Iannacchione et al. 1991) and in surveys of Medicare and Medicaid populations for which demographic and economic data are available from federal or state administrative files (CyBulski et al. 1999).

In the following section, we examine patterns of nonresponse and developing adjustment factors that are assigned to each respondent to compensate for nonrespondents. Then we describe the weight adjustment procedures.

1. Examining Patterns of Nonresponse

First, we examined the pattern of nonresponse relative to the data available on sample members. For this survey, we had different levels of data for the site sample and for the supplemental sample, as well as for subgroups based on their Round Two interview status. For both the site sample and the supplemental sample, we had three subgroups of physicians:

1. ***Round Two Interviews (Reinterviews).*** Physicians who completed the Round Two interview

2. ***Round Two Noninterviews.*** Physicians who were selected for the Round Two sample but who for some reason did not complete the interview

3. ***New Sample.*** Physicians in the Round Three sampling frame who were not selected for the Round Two sample

We therefore had six subgroups of physicians with different levels of data. We had the most information on physicians who completed the Round Two interview (Round Two Reinterviews). This included information from the Round Three sampling frame and responses to the Round Two instrument. We had information on Round Two noninterviews from the Round Three sampling frame and survey dispositions (such as response status). Only information from the Round Three sampling frame was available for *new* sample.

We developed separate logistic regression models for each of the six subgroups, since separate models better explain location and response patterns than through a single model. Location rates varied substantially by subgroup and different factors were expected to explain the ability to locate a physician than explain physician cooperation after being located.

The location adjustment factor for the reinterview physicians has to adjust for less than 2 percent of the sampled physicians, whereas the adjustment factors for the noninterview and new physicians have to compensate for approximately 10 percent of those samples. Response rates vary among subgroup more than do the location rates. The response adjustments factors have to compensate for approximately 18 percent for the reinterviews, 62 percent for the noninterviews, and 45 percent of the new sample who were located but did not complete the interview.

2. Developing Adjustment Factors

To estimate the adjustment factors for locating a physician and for responding among located physicians, we used weighted logistic regression to estimate a "response propensity" score for each physician. The modeling approach can result in a few sample members being assigned an extremely large adjustment factor (Little 1986). However, the possibility of large

adjustment factors can be reduced by using a restricted logistic regression model[2] or by trimming and compensating for adjustment factors from an unrestricted logistic regression model in a poststratification adjustment process. We used the latter approach.

The model-based nonresponse adjustments are predicted values (based on maximum likelihood estimators that are *consistent*, asymptotically *efficient*, asymptotically *normal*, and therefore, asymptotically *unbiased*) and were used in the computation of different sets of analysis weights. That is, the model-based propensity scores developed for the full sample were used to account for the inability to locate a physician and physician nonresponse in the computation of weights for site-level estimates (for both the unaugmented and the augmented samples) and for panel estimates.

After computing adjustment factors for the inability to locate a physician and for nonresponse among located physicians, we adjusted for mover and computed various sets of weights. We then checked these adjusted weights for consistency with known (or estimated) population counts of eligible physicians and poststratified the adjusted weights. We evaluated the few extreme weights, which could have unduly decreased the precision of the survey estimates and analysis, and trimmed some of them. The following section describes weight adjustment procedures and construction of analysis weights in more detail.

D. RESPONSE PROPENSITY MODELS

1. General Model Development

We prepared two sets of weighted logistic regression models to adjust the survey weights for our ability to locate physicians and to obtain a response (either a completed or ineligible

[2]The coefficients of the model are estimated based on restrictions on the size of the adjustment factor.

interview) among the located cases. We developed separate models for location and response for physicians who had a (1) completed interview in Round Two, (2) who were Round Two noninterviews (ineligible, refusal, or could not be located), and (3) who were not in the Round Two sample (new). We used this trichotomy because the physician characteristics associated with the ability to locate a physician and response varied across these three groups and because available data varied by group. We also developed separate models for the site and supplemental samples because different data were again available for each sample. In total, we developed 11 models—separate location and response adjustments for the site and supplemental sample crossed with the three groups (Round Two interviews, Round Two noninterviews, and new sample). Since 98 percent of the 1,049 reinterview physicians in the national supplement sample were located, we did not adjust separately for location for this subgroup (we used a combined locatability/response model for this group). Consequently, we developed 11 models.

Each model was used to predict the value for location or response among located cases as a function of physician characteristics represented by a series of indicator variables. We used the sampling weights in the location regression models and used the sampling weights adjusted for nonlocation in the response regression models.

After reviewing the results from our nonresponse analysis in Appendix C, we concluded that most of the characteristics mentioned in Appendix C could help to predict location or nonresponse. Therefore, we began by including all of them in the models (referred to as the full model). Many were multilevel categorical responses (for example, specialty type); these we transformed into a series of 1/0 indicator variables. The variables used in the logistic regression models are age, board-certification, country of medical school, gender, specialty, present employment, income (in reinterviews), Round Two survey disposition status (in noninterviews), region, and urban/rural. Besides these variables, we used second- and third-order interactions if

they were significant in the model. We used nested models so that all second-order interactions within a significant third-order interaction were included in the model, regardless of their significance.

The categories are chosen depending on the number of observations in each category and the different location or response rates in each one. For example, the categorization of specialty in the location model for the noninterviews uses only four categories: (1) general/family practice, (2) internal medicine, (3) pediatrics, and (4) other specialties. However, the response model for the noninterviews uses six categories: (1) general/family practice, (2) internal medicine, (3) pediatrics, (4) surgeons, (5) psychiatrists, and (6) other specialties. We collapsed categories with similar location and response rate patterns. For a few variables, we modified the indicator variable definitions depending on whether they were used for the locating models or for the response models. In addition, we combined variables with missing information (for example, unknown country of medical school) with other categories or created an indicator to denote a status of "missing."

To prepare the models, we used a weighted forward stepwise variable selection logistic regression procedure in the SAS software, which retains the significant predictors when a new predictor is introduced into the model. We obtained the "full" logistic regression model with this method. Then we used this full model in SUDAAN, which computes accurate variances for the estimates of the models and takes into account the sampling design of the survey to eliminate the predictors that are not significant.

Tables V.2 and V.3 summarize the logistic regression models that we used for the five location models for the site and supplemental sample, and Tables V.4 and V.5 present the results for the six response models for the site and supplemental sample. For each variable, the tables present the standardized coefficient assigned to the indicator variable or physician characteristic;

TABLE V.2

RESULTS OF THE LOCATION MODELING PROCEDURES, BY PANEL, FOR THE SITE SAMPLE

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff	Sig[b]	Odds Ratio[c]	New[f] Beta Coeff	Sig[b]	Odds Ratio[c]
Intercept	2.036	***	7.7	–0.67	*	0.5	1.216	***	3.4
Age 40-49 (Less than 40)	–0.388			–0.192			–0.622		
Age 50 or Older	1.298			–0.335			0.497		
Board-Certification (Not Certified)	0.556			1.199			0.342		
USA Canada Medical School (Other)	0.197			0.342			0.311		
Income $100,000-$150,000 (<$100,000)	0.458								
Income > $150,000	1.068								
Nonmetropolitan (MSA)				–0.548			0.981		
Present Employment Solo or 2 (Other)	1.096			0.514			2.135		
Present Employment Group	0.861			0.846			–0.207		
Status Refusal (Ineligible)				3.075					
Status Not Located				2.331					
Region NorthEast (South)	2.421			0.155			0.010		
Region North Central	1.035			0.388			0.768		
Region West	0.560			–0.322			–0.043		
Specialty Gen/Fam Practice (Internal Medicine)							0.966		
Specialty Pediatrics							0.829		
Specialty Other							2.039		
Specialty Gen/Fam Practice (Pediatrics)				0.533					
Specialty Internal Medicine				0.914					
Specialty Other				0.848					
Gender Male (Female)				0.125			–0.051		
Age 40-49 – Board-Certification (Less than 40 – Not Certified)							1.366		
Age 50 or Older – Board-Certification							0.239		
Age 40-49 – Status Refusal (Less than 40 – Ineligible)				–1.657	**	17.9			
Age 40-49 – Status Not Located				0.391		8.5			
Age 50 or Older – Status Refusal				–1.274	**	15.5			
Age 50 or Older – Status Not Located				0.346		7.4			
Age 40-49– Present Employment Solo or 2 (Less than 40 – Other)							–1.507		1.0
Age 40 - 49 – Present Employment Group							0.631	-	0.8
Age 50 or Older – Present Employment Solo or 2							–1.772		2.4
Age 50 or Older – Present Employment Group							0.843	-	3.1
Age 40-49 – Region Northeast (Less than 40 – South)	–0.241		6.0	–0.460		1.0			

[a]Reference cell is noted in parentheses for all characteristic indicator variables.

[b]The significance levels are noted by: *** the smallest *P* value for the category of predictors smaller than 0.001, ** the smallest *P* value for the category of predictors smaller than 0.01, * the smallest *P* value for the category of predictors smaller than 0.05 and - the smallest *P* value for the category of predictors smaller than 0.1.

[c]The regression models include main effects and second and third order interactions. The odds ratio of a second/third order interaction is computed as the exponential of the sum of the coefficients involved with the second/third order interactions.

[d]The reinterviews are the physicians who completed Round Two interviews.

[e]The noninterviews are the physicians who were selected for the Round Two sample but did not complete the interview.

[f]The new sample includes physicians in Round Three sampling frame who were not selected for the Round Two sample

TABLE V.2 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff	Sig[b]	Odds Ratio[c]	New[f] Beta Coeff	Sig[b]	Odds Ratio[c]
Age 40-49 – Region North Central	0.797		4.2	0.505		1.2			
Age 40-49 – Region West	1.303	**	4.4	–0.302		0.6			
Age 50 or Older – Region Northeast	–0.249		32.1	0.001		0.8			
Age 50 or Older – Region North Central	0.284		4.9	0.762	*	1.1			
Age 50 or Older – Region West	–0.251		5.0	–0.241		0.5			
Age 40 - 49 – Gender Male (Less than 40 – Female)							0.154		
Age 50 or Older – Gender Male							–0.150		
Board-Certification – Status Refusal (Not Certified – Ineligible)				–0.258					
Board-Certification –Status Not Located				–0.105					
Board-Certification – Present Employment Solo or 2 (Not Certified – Other)				0.660					
Board-Certification – Present Employment Group				–0.758					
Board-Certification – Specialty Gen/Fam Practice (Not Certified – Internal Medicine)							–0.426		
Board-Certification – Specialty Pediatrics							–1.082		
Board-Certification – Specialty Other							–0.832		
Board-Certification – Specialty Gen/Fam Practice (Not Certified – Pediatrics)				–0.358		5.7			
Board-Certification – Specialty Internal Medicine				–1.167	***	8.3			
Board-Certification – Specialty Other				–0.517		7.7			
USA/Canada Medical School – Board-Certification (Other –Not Certified)	0.607		3.9				–0.022		
USA/Canada Medical School – Status Refusal (Other – Ineligible)				–0.023					
USA/Canada Medical School – Status Not Located				0.156					
USA/Canada Medical School – Nonmetropolitan (Other – MSA)							–0.921		1.4
USA/Canada Medical School – Present Employment Solo or 2 (Other – Other)				0.211					
USA/Canada Medical School – Present Employment Group				–0.079					
USA/Canada Medical School – Region Northeast (Other – South)				0.656	-	1.6	–0.136		
USA/Canada Medical School – Region North Central				–0.555		2.1	–0.850		
USA/Canada Medical School – Region West				–0.332		1.0	0.096		
USA/Canada Medical School – Specialty Gen/Fam Practice (Other – Internal Medicine)							–0.717		
USA/Canada Medical School – Specialty Pediatrics							–0.374		
USA/Canada Medical School – Specialty Other							–1.649		
Status Refusal – Region Northeast (Ineligible – South)				–0.224					
Status Refusal – Region North Central				–0.847					
Status Refusal – Region West				1.990					
Status Not Located – Region Northeast				–0.933					
Status Not Located – Region North Central				–1.126					
Status Not Located – Region West				0.370					
Status Refusal – Gender Male (Ineligible – Female)				–0.411					
Status Not Located – Gender Male				0.065					
Nonmetropolitan – Present Employment Solo or 2 (MSA – Other)				5.595					
Nonmetropolitan – Present Employment Group				–0.996					
Nonmetropolitan – Specialty Gen/Fam Practice (MSA – Pediatrics)				0.829	***	1.0			

TABLE V.2 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff	Sig[b]	Odds Ratio[c]	New[f] Beta Coeff	Sig[b]	Odds Ratio[c]
Nonmetropolitan – Specialty Internal Medicine				–0.247		1.4			
Nonmetropolitan – Specialty Other				0.874	**	1.3			
Nonmetropolitan – Gender Male (MSA – Female)				0.573					
Present Employment Solo or 2 – Status Refusal (Other – Ineligible)				–0.304					
Present Employment Solo or 2 – Status Not Located				2.505					
Present Employment Group – Status Refusal				6.187					
Present Employment Group – Status Not Located				2.133					
Present Employment Solo or 2 – Income $100,000-$150,000 (Other – <$100,000)	–1.525	**	1.0						
Present Employment Solo or 2 – Income >$150,000	–0.496		5.3						
Present Employment Group – Income $100,000-$150,000	–0.373		2.6						
Present Employment Group – Income >$150,000	–0.346		4.9						
Present Employment Solo or 2 – Specialty Gen/Fam Practice (Other – Pediatrics)				–0.546		2.8			
Present Employment Solo or 2 – Specialty Internal Medicine				0.236		4.2			
Present Employment Solo or 2 – Specialty Other				–0.728		3.9			
Present Employment Group – Specialty Gen/Fam Practice				0.184		4.0			
Present Employment Group – Specialty Internal Medicine				0.472		5.8			
Present Employment Group – Specialty Other				0.840	*	5.4			
Region Northeast – Board-Certification (South – Not Certified)	–1.676	*	3.7				0.025		1.5
Region North Central – Board Certified	–1.811	***	0.8				0.227		3.8
Region West – Board Certified	–1.385	**	0.8				–0.524	-	0.8
Region Northeast– Income $100,000 - 150,000 (South – <$100,000)	0.757		37.9						
Region Northeast – Income > $150,000	–0.809		14.6						
Region North Central – Income $100,000 - 150,000	0.733		9.3						
Region North Central – Income > $150,000	0.246		10.5						
Region West – Income $100,000 - 150,000	0.106		3.1						
Region West – Income > $150,000	–0.354		3.6						
Region Northeast – Nonmetropolitan (South – MSA)				–0.463	-	0.7			
Region North Central – Nonmetropolitan				–0.988	***	0.9			
Region West – Nonmetropolitan				–0.054		0.4			
Region Northeast-- Specialty Gen/Fam Practice (South – Internal Medicine)							–0.045		
Region Northeast – Specialty Pediatric							–0.626		
Region Northeast – Specialty Other							–0.382		
Region North Central – Specialty Gen/Fam Practice							–1.360		
Region North Central – Specialty Pediatrics							–0.634		
Region North Central – Specialty Other							–1.597		
Region West – Specialty Gen/Fam Practice							–1.055		
Region West – Specialty Pediatrics							1.076		
Region West – Specialty Other							0.002		
Region Northeast – Gender Male (South – Female)				–0.640					
Region North Central – Gender Male				–0.518					
Region West – Gender Male				0.503					

TABLE V.2 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff	Sig[b]	Odds Ratio[c]	New[f] Beta Coeff	Sig[b]	Odds Ratio[c]
Specialty Gen/Fam Practice – Gender Male (Internal Medicine – Female)							0.511		
Specialty Pediatrics – Gender Male							–0.323		
Specialty Other – Gender Male							–1.232		
Gender Male – Board-Certification (Female – Not Certified)							0.351		
Gender Male – USA/Canada Medical School (Female – Other)							0.143		
Gender Male – Present Employment Solo or 2 (Female – Other)				–0.516					
Gender Male – Present Employment Group				–0.613					
Age 40 - 49 – Board-Certification – Gender Male (Less than 40 – Not Certified – Female)							–0.641		2.5
Age 50 or Older – Board-Certification – Gender Male							–0.162		2.9
Board-Certification – USA/Canada Medical School – Specialty Gen/Fam Practice (Not Certified – Other – Internal Medicine)							0.312		2.2
Board-Certification – USA/Canada Medical School – Specialty Pediatrics							1.094	-	1.3
Board-Certification – USA/Canada Medical School – Specialty Other							1.188	*	4.0
Board-Certification – Status Refusal – Present Employment Solo or 2 (Not Certified – Ineligible – Other)				–0.412		87.7			
Board-Certification – Status Refusal – Present Employment Group				–0.698		6291.8			
Board-Certification – Status Not Located – Present Employment Solo or 2				–1.237	*	353.2			
Board-Certification – Status Not Located – Present Employment Group				1.016		782.1			
Board-Certification – Present Employment Solo or 2 – Gender Male (Not Certified – Other – Female)							0.206		19.7
Board-Certification – Group – Gender Male							0.780	-	3.4
USA/Canada Medical School – Status Refusal – Present Employment Solo or 2 (Other – Ineligible – Other)				1.193		149.6			
USA/Canada Medical School – Status Refusal – Present Employment Group				–4.612	***	309.8			
USA/Canada Medical School – Status Not Located – Present Employment Solo or 2				–1.028		153.1			
USA/Canada Medical School – Status Not Located – Present Employment Group				–2.253	-	32.3			
USA/Canada Medical School – Region North East – Specialty Gen/Fam Practice (Other – South – Internal Medicine)							0.367		2.1
USA/Canada Medical School – Region North East – Specialty Pediatrics							1.366		2.8
USA/Canada Medical School – Region North East – Specialty Other							0.789		2.7
USA/Canada Medical School – Region North Central – Specialty Gen/Fam Practice							1.263		1.5
USA/Canada Medical School – Region North Central – Specialty Pediatrics							1.204		1.6
USA/Canada Medical School – Region North Central – Specialty Other							1.754	**	2.2
USA/Canada Medical School – Region West – Specialty Gen/Fam Practice							1.154	-	2.0
USA/Canada Medical School – Region West – Specialty Pediatrics							–1.264		1.9

TABLE V.2 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff	Sig[b]	Odds Ratio[c]	New[f] Beta Coeff	Sig[b]	Odds Ratio[c]
USA/Canada Medical School – Region West – Specialty Other							–0.478		1.3
USA/Canada Medical School – Specialty Gen/Fam Practice – Gender Male (Other – Internal Medicine – Female)							–0.647		1.7
USA/Canada Medical School – Specialty Pediatrics – Gender Male							0.332		2.4
USA/Canada Medical School – Specialty Other – Gender Male							1.362	*	2.5
Status Refusal – Region Northeast – Gender Male (Ineligible – South – Female)				1.646	-	41.5			
Status Refusal – Region North Central – Gender Male				1.386		53.9			
Status Refusal – Region West – Gender Male				–2.203	**	15.8			
Status Not Located – Region North East – Gender Male				1.783	*	17.9			
Status Not Located – Region North Central – Gender Male				0.845		8.2			
Status Not Located – Region West – Gender Male				–0.543		12.5			
Nonmetropolitan – Present Employment Solo or 2 – Gender Male (MSA – Other – Female)				–6.407	***	0.5			
Nonmetropolitan – Present Employment Group – Gender Male				0.829	-	1.2			
R^2 (reported in the sig. column)		0.016			0.175			0.050	

TABLE V.3

RESULTS OF THE LOCATION MODELING PROCEDURES BY PANEL,
FOR THE SUPPLEMENTAL SAMPLE

	Noninterview[d]			New[e]		
Characteristic/Indicator Variable[a]	Beta Coeff.	Sig[b]	Odds Ratio[c]	Beta Coeff.	Sig[b]	Odds Ratio[c]
Intercept	–0.915			0.880	*	1.0
Age 45 and Older (Less than 45)	0.688			0.940	*	2.6
Board-Certification (Not Certified)	1.432			0.413		
Gender Male (Female)	0.541			–0.239		
Status Not Located (Ineligible and Refusals)	1.929					
Present Employment Solo or 2 or Group (Other)				0.783	-	2.2
Specialty Specialist (PCP)	0.621					
USA/Canada Medical School (Other)	2.897			0.924	**	2.5
Age 45 and Older – Board-Certification (Less than 45 – Not Certified)	–1.530					
Gender Male – Board-Certification (Female – Not Certified)				0.981		3.2
Specialty Specialist – Gender Male (PCP – Female)	0.808		7.2			
Age 45 and Older – Status Not Located (Less than 45 – Ineligible and Refusals)	1.196		45.3			
Age 45 and Older – Specialty Specialist (Less than 45 – PCP)	–1.467	-	0.9			
Age 45 and Older – USA/Canada Medical School (Less than 45 – Other)	–2.513					
Board-Certification in Specialty – USA/Canada Medical School (Not Certified – Other)	–2.679					
Age 45 and Older – Board-Certification – USA/Canada Medical School (Less than 45 – Not Certified – Other)	3.278	-	4.8			
R^2 (presented in sig. column)		0.158			0.069	

[a]Reference cell is noted in parentheses for all characteristic indicator variables.

[b]The significance levels are noted by: *** the smallest *P* value for the category of predictors smaller than 0.001, ** the smallest *P* value for the category of predictors smaller than 0.01, * the smallest *P* value for the category of predictors smaller than 0.05 and - the smallest *P* value for the category of predictors smaller than 0.1.

[c]The regression models include main effects, second- and third-order interactions. The odds ratio of a second/third-order interaction is computed as the exponential of the sum of the coefficients involved with the second/third-order interactions.

[e]The noninterviews are the physicians who were selected for the Round Two sample but did not complete the interview.

[f]The new sample includes physicians in Round Three sampling frame who were not selected for the Round Two sample

TABLE V.4

RESULTS OF THE RESPONSE MODELING PROCEDURES, BY PANEL, FOR THE SITE SAMPLE

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
Intercept	–0.468		0.6	–3.483	**	<0.1	0.350		1.4
Age Less than 40 (40-49)	–0.389			–0.419			0.645		
Age 50-59	0.08[d]0			–0.570			–0.622		
Age More than 60	1.108			0.337			0.424		
Board-Certification (Not Board-Certified)	1.682			2.308			0.555		
USA/Canada Medical School (Other)	1.991			3.331			–0.825		
Income Less than $100,000 (More than $250,000)	1.072								
Income $100,000-$150,000	–0.205								
Income $150,000-$200,000	1.085								
Income $200,000-$250,000	–0.872								
Nonmetropolitan (MSA)	–0.873			2.572			0.979		
Present Employment Solo or 2 Practice (Other)	–0.505			–0.882			–0.135		
Present Employment Group Practice	–2.420			0.164			–0.705		
Status Ineligible (Refusals)				2.942					
Status Not Located				2.090					
Region Northeast (South)	0.997			1.578			0.884		
Region North Central	0.768			1.105			0.381		
Region West	2.139			1.000			–0.676		
Specialty Gen/Fam Practice (Surgeons)				2.605			–0.225		
Specialty Internal Medicine				2.455			–0.479		
Specialty Pediatrics				2.367			0.016		
Specialty Psychiatry				1.809			0.030		
Specialty Other Specialties				2.272			–0.052		
Specialty Gen/Fam Practice (Pediatrics)	–0.115								
Specialty Internal Medicine	0.038								
Specialty Other	0.400								
Gender Male (Female)	1.666			–0.056			–0.105		
Age Less than 40 – Board-Certification (40-49 – Not Board-Certified)	–0.568			0.606					

[a]Reference cell is noted in parentheses for all characteristic indicator variables.

[b]The significance levels are noted by: *** the smallest P value for the category of predictors smaller than 0.001, ** the smallest P value for the category of predictors smaller than 0.01, * the smallest P value for the category of predictors smaller than 0.05 and - the smallest P value for the category of predictors smaller than 0.1.

[c]The regression models include main effects, second- and third-order interactions. The odds ratio of a second/third-order interaction is computed as the exponential of the sum of the coefficients involved with the second/third-order interaction.

[d]The reinterviews are the physicians who completed Round Two interviews.

[e]The noninterviews are the physicians who were selected for the Round Two sample but did not complete the interview.

[f]The new sample includes physicians in Round Three sampling frame who were not selected for the Round Two sample

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
Age 50-59 – Board-Certification	–0.447			–0.438					
Age More than 60 – Board-Certification	–0.195			–0.849					
Age Less than 40 – USA/Canada Medical School (40-49 – Other)				–0.288		13.8	–0.244		
Age 50-59 – USA/Canada Medical School				0.532	**	26.9	0.402		
Age More than 60 – USA/Canada Medical School				0.121		44.2	–1.382		
Age Less than 40 – Status Ineligible (40-49 – Refusals)				0.756					
Age Less than 40 – Status Not Located				1.050					
Age 50-59 – Status Ineligible				0.462					
Age 50-59 – Status Not Located				0.234					
Age More than 60 – Status Ineligible				–0.332					
Age More than 60 – Status Not Located				–0.409					
Age Less than 40 – Income Less than $100,000 (40-49 – More than $250,000)	0.326								
Age Less than 40 – Income $100,000-$150,000	0.500								
Age Less than 40 – Income $150,000-$200,000	–0.479								
Age Less than 40 – Income $200,000-$250,000	3.390								
Age 50-59 – Income Less than $100,000	0.391								
Age 50-59 – Income $100,000-$150,000	0.699								
Age 50-59 – Income $150,000-$200,000	1.123								
Age 50-59 – Income $200,000-$250,000	1.866								
Age More than 60 – Income Less than $100,000	–0.114								
Age More than 60 – Income $100,000-$150,000	0.377								
Age More than 60 – Income $150,000-$200,000	–0.453								
Age More than 60 – Income $200,000-$250,000	1.552								
Age Less than 40 – Nonmetropolitan (40-49 – MSA)	–1.731	***	0.1	–0.249			0.207		6.2
Age 50-59 – Nonmetropolitan	–0.790	**	0.2	–0.775			–1.081	*	0.5
Age More than 60 – Nonmetropolitan	3.985	***	68.0	–1.983			0.000		4.1
Age Less than 40 – Present Employment Solo or 2 Practice (40-49 – Other)	0.710			0.628			–0.604		
Age Less than 40 – Present Employment Group Practice	0.207			1.049			0.781		
Age 50-59 – Present Employment Solo or 2 Practice	–0.498			–0.250			0.542		
Age 50-59 – Present Employment Group Practice	0.259			–0.837			0.277		
Age More than 60 – Present Employment Solo or 2 Practice	–0.470			0.419			0.387		
Age More than 60 – Present Employment Group Practice	–0.921			0.477			1.957		
Age Less than 40 – Region Northeast (40-49 – South)	0.721						–0.226		
Age Less than 40 – Region North Central	–0.430						0.088		
Age Less than 40 – Region West	–0.206						–0.162		
Age 50-59 – Region Northeast	0.164						0.585		
Age 50-59 – Region North Central	–0.023						0.117		
Age 50-59 – Region West	–0.737						0.421		
Age More than 60 – Region Northeast	–0.772						–0.323		
Age More than 60 – Region North Central	–0.460						0.053		
Age More than 60 – Region West	–0.197						–0.197		
Age Less than 40 – Specialty Gen/Fam Practice (40-49 – Surgeons)				0.009		9.0	–0.394		1.0

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
Age Less than 40 – Specialty Internal Medicine				0.175		13.7	–0.207		1.0
Age Less than 40 – Specialty Pediatrics				0.581		5.9	–0.895		0.8
Age Less than 40 – Specialty Psychiatry				–0.165		5.7	–0.359		1.4
Age Less than 40 – Specialty Other Specialties				0.528		8.1	–0.714		0.9
Age 50-59 – Specialty Gen/Fam Practice				0.343		10.8	–0.187		0.4
Age 50-59 – Specialty Internal Medicine				0.245		8.4	–0.748		0.2
Age 50-59 – Specialty Pediatrics				1.155	**	19.1	–1.147		0.2
Age 50-59 – Specialty Psychiatry				0.682		6.8	–0.388		0.4
Age 50-59 – Specialty Other Specialties				0.137		6.3	–0.095		0.5
Age More than 60 – Specialty Gen/Fam Practice				0.021		19.4	0.286		1.6
Age More than 60 – Specialty Internal Medicine				0.078		17.6	0.770		2.0
Age More than 60 – Specialty Pediatrics				0.971	*	39.4	0.464		2.5
Age More than 60 – Specialty Psychiatry				0.887		20.8	–0.115		1.4
Age More than 60 – Specialty Other Specialties				0.118		15.3	0.132		1.7
Age Less than 40 – Gender Male (40-49 – Female)	1.360			0.298			0.482		
Age 50-59 – Gender Male	0.504			0.608			0.944		
Age More than 60 – Gender Male	–0.540			–0.423			0.098		
Board-Certification – USA/Canada Medical School (Not Board-Certified – Other)	–0.874			–0.056			0.075		
Board-Certification – Status Ineligible (Not Board-Certified - Refusals)				–1.318					
Board-Certification – Status Not Located				–0.788					
Board-Certification – Income Less than $100,000 (Not Board-Certified – More than $250,000)	0.290								
Board-Certification – Income $100,000-$150,000	0.705								
Board-Certification – Income $150,000-$200,000	–1.236								
Board-Certification – Income $200,000-$250,000	2.534								
Board-Certification – Nonmetropolitan (Not Board-Certified – MSA)	1.641			–0.885			0.003		
Board-Certification – Present Employment Solo or 2 Practice (Not Board-Certified – Other)	–1.049			0.961			–0.141		
Board-Certification – Present Employment Group Practice	–0.673			–0.034			–0.358		
Board-Certification – Region Northeast (Not Board Certified - South)	–0.582			–0.511			–0.090		
Board-Certification – Region North Central	–0.632			–0.689			0.041		
Board-Certification – Region West	–1.597			–0.674			1.052		
Board-Certification – Specialty Gen/Fam Practice (Not Board-Certified – Surgeons)				–2.320			–0.725	*	0.7
Board-Certification – Specialty Internal Medicine				–2.011			–0.500		0.7
Board-Certification – Specialty Pediatrics				–2.224			–0.735		0.8
Board-Certification – Specialty Psychiatry				–2.342			–0.738		0.9
Board-Certification – Specialty Other Specialties				–2.307			–1.166	**	0.5
Board-Certification – Specialty Gen/Fam Practice (Not Board-Certified – Pediatrics)	–0.637								
Board-Certification – Specialty Internal Medicine	–1.017								
Board-Certification – Specialty Other	–1.821								
Board-Certification – Gender Male (Not Board-Certified – Female)	–0.092			0.018					
USA/Canada Medical School – Status Ineligible (Other – Refusals)				0.565					

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
USA/Canada Medical School – Status Not Located				0.177					
USA/Canada Medical School – Income Less than $100,000 (Other – More than $250,000)	–1.006								
USA/Canada Medical School – Income $100,000-$150,000	–0.213								
USA/Canada Medical School – Income $150,000-$200,000	0.382								
USA/Canada Medical School – Income $200,000-$250,000	–2.473								
USA/Canada Medical School – Nonmetropolitan (Other – MSA)				–0.661	***	189.0	–1.016		
USA/Canada Medical School – Present Employment Solo or 2 Practice (Other – Other)	–0.205						–0.199		
USA/Canada Medical School – Present Employment Group Practice	0.282						0.339		
USA/Canada Medical School – Region Northeast (Other – South)	–0.969			–0.499			–0.464		
USA/Canada Medical School – Region North Central	–0.422			–0.596			–0.472		
USA/Canada Medical School – Region West	–0.624			–0.830			0.914		
USA/Canada Medical School – Specialty Gen/Fam Practice (Other – Surgeons)				–3.086	***	17.3	1.035	-	1.0
USA/Canada Medical School – Specialty Internal Medicine				–3.091	***	14.8	0.927		0.7
USA/Canada Medical School – Specialty Pediatrics				–2.962	***	15.4	1.577	*	2.2
USA/Canada Medical School – Specialty Psychiatry				–2.204	**	18.8	1.188	-	1.5
USA/Canada Medical School – Specialty Other Specialties				–3.072	***	12.6	1.334	*	1.6
Status Ineligible Present Employment Solo or 2 Practice (Refusals – Other)				0.948					
Status Ineligible – Present Employment Group Practice				–0.060					
Status Not Located – Present Employment Solo or 2 Practice				0.983					
Status Not Located – Present Employment Group Practice				0.153					
Status Ineligible – Region Northeast (Refusals – South)				–0.878					
Status Ineligible – Region North Central				–0.918					
Status Ineligible – Region West				–1.175					
Status Not Located – Region Northeast				0.107					
Status Not Located – Region North Central				0.093					
Status Not Located – Region West				0.690					
Status Ineligible – Specialty Gen/Fam Practice (Refusals – Surgeons)				–0.561					
Status Ineligible – Specialty Internal Medicine				–0.436					
Status Ineligible – Specialty Pediatrics				–0.580					
Status Ineligible – Specialty Psychiatry				–2.504					
Status Ineligible – Specialty Other Specialties				–0.615					
Status Not Located – Specialty Gen/Fam Practice				–1.452					
Status Not Located – Specialty Internal Medicine				–1.630					
Status Not Located – Specialty Pediatrics				–2.361					
Status Not Located – Specialty Psychiatry				–1.998					
Status Not Located – Specialty Other Specialties				–1.914					
Status Ineligible – Gender Male (Refusals – Female)				–0.234					
Status Not Located – Gender Male				0.806					

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
Income Less than $100,000 – Nonmetropolitan (More than $250,000 – MSA)	1.807	***	7.4						
Income $100,000-$150,000 – Nonmetropolitan	1.766	***	2.0						
Income $150,000-$200,000 – Nonmetropolitan	1.292	***	4.5						
Income $200,000-$250,000 – Nonmetropolitan	2.315	***	1.8						
Income Less than $100,000 – Specialty Gen/Fam Practice (More than $250,000 – Pediatrics)	–0.162								
Income Less than $100,000 – Specialty Internal Medicine	–0.364								
Income Less than $100,000 – Specialty Other	–1.023								
Income $100,000-$150,000 – Specialty Gen/Fam Practice	0.929								
Income $100,000-$150,000 – Specialty Internal Medicine	0.874								
Income $100,000-$150,000 – Specialty Other	0.056								
Income $150,000-$200,000 – Specialty Gen/Fam Practice	–0.147								
Income $150,000-$200,000 – Specialty Internal Medicine	0.392								
Income $150,000-$200,000 – Specialty Other	–0.878								
Income $200,000-$250,000 – Specialty Gen/Fam Practice	0.136								
Income $200,000-$250,000 – Specialty Internal Medicine	2.816								
Income $200,000-$250,000 – Specialty Other	0.607								
Income Less than $100,000 – Gender Male (More than $250,000 – Female)	–0.493								
Income $100,000-$150,000 – Gender Male	–0.640								
Income $150,000-$200,000 – Gender Male	–0.621								
Income $200,000-$250,000 – Gender Male	–0.104								
Nonmetropolitan – Present Employment Solo or 2 Practice (MSA – Other)				–0.494	***	3.3	1.172		
Nonmetropolitan – Present Employment Group Practice				–0.941	***	6.0	–0.971		
Nonmetropolitan – Region Northeast (MSA – South)	–0.742			–2.444			–1.411		
Nonmetropolitan – Region North Central	–1.098			–0.799			–0.099		
Nonmetropolitan – Region West	0.450			–0.041			0.026		
Nonmetropolitan – Specialty Gen/Fam Practice (MSA – Surgeons)				–0.535	*	103.8			
Nonmetropolitan – Specialty Internal Medicine				–0.302		112.7			
Nonmetropolitan – Specialty Pediatrics				–0.364		97.0			
Nonmetropolitan – Specialty Psychiatry				0.501		131.9			
Nonmetropolitan – Specialty Other Specialties				0.019		129.4			
Nonmetropolitan – Specialty Gen/Fam Practice (MSA – Pediatrics)	0.193		0.3						
Nonmetropolitan – Specialty Internal Medicine	–0.674	***	0.5						
Nonmetropolitan – Specialty Other	–0.171		0.5						
Nonmetropolitan – Gender Male (MSA – Female)	0.720			–0.675			–0.253		
Present Employment Solo or 2 Practice – Income Less than $100,000 (Other – More than $250,000)	0.189								
Present Employment Solo or 2 Practice - Income $100,000-$150,000	–0.001								
Present Employment Solo or 2 Practice - Income $150,000-$200,000	0.715								
Present Employment Solo or 2 Practice - Income $200,000-$250,000	–1.051								

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
Present Employment Group Practice – Income Less than $100,000	0.291								
Present Employment Group Practice - Income $100,000-$150,000	–0.172								
Present Employment Group Practice - Income $150,000-$200,000	1.381								
Present Employment Group Practice - Income $200,000-$250,000	0.400								
Present Employment Solo or 2 Practice – Region Northeast (Other – South)	0.771			0.588			–0.446		
Present Employment Solo or 2 Practice – Region North Central	0.424			1.566			–0.753		
Present Employment Solo or 2 Practice – Region West	0.675			1.051			0.284		
Present Employment Group Practice – Region Northeast	0.452						–1.484		
Present Employment Group Practice – Region North Central	0.338						1.218		
Present Employment Group Practice – Region West	1.013						1.528		
Present Employment Solo or 2 Practice – Specialty Gen/Fam Practice (Other – Surgeons)				0.225		7.0			
Present Employment Solo or 2 Practice – Specialty Internal Medicine				0.074		5.2			
Present Employment Solo or 2 Practice – Specialty Pediatrics				–0.339		3.1			
Present Employment Solo or 2 Practice – Specialty Psychiatry				0.798		5.6			
Present Employment Solo or 2 Practice – Specialty Other Specialties				–0.266		3.1			
Present Employment Group Practice – Specialty Gen/Fam Practice				0.174		19.0			
Present Employment Group Practice – Specialty Internal Medicine				–0.045		13.1			
Present Employment Group Practice – Specialty Pediatrics				–0.078		11.6			
Present Employment Group Practice – Specialty Psychiatry				0.394		10.7			
Present Employment Group Practice – Specialty Other Specialties				–0.314		8.3			
Present Employment Solo or 2 Practice – Specialty Gen/Fam Practice (Other - Pediatrics)	0.525								
Present Employment Solo or 2 Practice – Specialty Internal Medicine	0.774								
Present Employment Solo or 2 Practice – Specialty Other	0.871								
Present Employment Group Practice – Specialty Gen/Fam Practice	2.073								
Present Employment Group Practice – Specialty Internal Medicine	1.520								
Present Employment Group Practice – Specialty Other	2.261								
Present Employment Solo or 2 Practice – Gender Male (Other – Female)	–0.233			–0.062			–0.107		
Present Employment Group Practice – Gender Male	0.665			0.259			0.684		
Region Northeast – Income Less than $100,000 (Other – South – More than $250,000)	–0.242								
Region Northeast – Income $100,000-$150,000	–0.066								
Region Northeast – Income $150,000-$200,000	–1.150								
Region Northeast – Income $200,000-$250,000	–0.299								
Region North Central – Income Less than $100,000	0.077								
Region North Central – Income $100,000-$150,000	–0.219								
Region North Central - Income $150,000-$200,000	–0.423								

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
Region North Central - Income $200,000-$250,000	–0.499								
Region West - Income Less than $100,000	–1.418								
Region West - Income $100,000-$150,000	–1.274								
Region West - Income $150,000-$200,000	–1.728								
Region West – $200,000-250,00	–1.206								
Region Northeast – Specialty Gen/Fam Practice (South – Surgeons)				–0.758	-	30.7			
Region Northeast – Specialty Internal Medicine				–0.754		26.5			
Region Northeast – Specialty Pediatrics				–1.215	**	15.3			
Region Northeast – Specialty Psychiatry				–0.237		23.3			
Region Northeast – Specialty Other Specialties				–0.545		27.2			
Region North Central – Specialty Gen/Fam Practice				–0.821	-	18.0			
Region North Central – Specialty Internal Medicine				–0.933	-	13.8			
Region North Central – Specialty Pediatrics				–0.621		17.3			
Region North Central – Specialty Psychiatry				–0.395		12.4			
Region North Central – Specialty Other Specialties				–0.924	*	11.6			
Region West – Specialty Gen/Fam Practice				–0.888	*	15.1			
Region West – Specialty Internal Medicine				–0.663	-	16.3			
Region West – Specialty Pediatrics				–0.801	*	13.0			
Region West – Specialty Psychiatry				–0.561		9.5			
Region West – Specialty Other Specialties				–0.799	*	11.9			
Region Northeast – Specialty Gen/Fam Practice (South - Pediatrics)	0.183								
Region Northeast – Specialty Internal Medicine	–0.232								
Region Northeast – Specialty Other	0.183								
Region North Central – Specialty Gen/Fam Practice	–0.394								
Region North Central – Specialty Internal Medicine	0.039								
Region North Central – Specialty Other	0.333								
Region West – Specialty Gen/Fam Practice	0.277								
Region West – Specialty Internal Medicine	–0.101								
Region West – Specialty Other	0.212								
Region Northeast – Gender Male (South – Female)	–0.897			–0.228			–0.249		
Region North Central – Gender Male	–1.039			–0.017			0.232		
Region West – Gender Male	–1.085			0.038			–0.470		
Specialty Gen/Fam Practice – Gender Male (Surgeons - Female)				–0.204					
Specialty Internal Medicine – Gender Male				–0.094					
Specialty Pediatrics – Gender Male				–0.065					
Specialty Psychiatry – Gender Male				–0.385					
Specialty Other Specialties – Gender Male				0.309					
Gender Male –USA/Canada Medical School (Female – Other)	–2.490						–0.011		
Age Less than 40 – Board-Certification – Status Ineligible (40-49 – Not Board-Certified -Refusals)				–1.613		109.7			
Age Less than 40 – Board-Certification – Status Not Located				–1.451	*	88.4			
Age 50-59 – Board-Certification – Status Ineligible				–0.667		76.3			
Age 50-59 – Board-Certification – Status Not Located				0.065		73.5			

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
Age More than 60 – Board-Certification – Status Ineligible				0.944		138.0			
Age More than 60 – Board-Certification – Status Not Located				1.443	-	129.5			
Age Less than 40 – Board-Certification – Nonmetropolitan (40-49 – Not Board-Certified – MSA)				0.677	-	110.7			
Age 0-59 – Board-Certification – Nonmetropolitan				–0.964	***	3.8			
Age More than 60 – Board-Certification – Nonmetropolitan				1.069	**	31.6			
Age Less than 40 – Board-Certification – Present Employment Solo or 2 Practice (40-49 – Not Board-Certified – Other)				–1.285	-	2.6			
Age Less than 40 – Board-Certification – Present Employment Group Practice				–1.566		8.5			
Age 50-59 – Board-Certification –Present Employment Solo or 2 Practice				0.211		1.5			
Age 50-59 – Board-Certification – Present Employment Group Practice				0.614		1.4			
Age More than 60 – Board-Certification – Present Employment Solo or 2 Practice				–1.039	*	0.6			
Age More than 60 - Board-Certification – Present Employment Group Practice				–1.421	*	7.2			
Age Less than 40 – Board-Certification – Region North East (40-49 – Not Board-Certified - South)	–0.267		4.9	0.071		31.7			
Age Less than 40 – Board-Certification – Region North Central	0.325		2.1	0.287		24.9			
Age Less than 40 – Board-Certification – Region West	0.397		4.3	0.107		3.6			
Age 50-59 – Board-Certification – Region Northeast	–0.324		4.8	0.161		2.1			
Age 50-59 – Board-Certification – Region North Central	–0.102		3.8	1.020	**	30.7			
Age 50-59 – Board-Certification – Region West	0.402		4.6	1.006	**	3.7			
Age More than 60 – Board-Certification – Region North East	0.590		16.9	0.476		6.3			
Age More than 60 – Board-Certification – Region North Central	0.850	-	22.7	0.414		1.0			
Age More than 60 – Board-Certification – Region West	–0.691		9.5	0.286		21.8			
Age Less than 40 – Board-Certification – Gender Male (40-49 – Not Board-Certified – Female)				0.086		17.1			
Age 50-59 – Certified – Gender Male				–0.252		5.0			
Age More than 60 – Board-Certification – Gender Male				1.316	*	14.2			
Age Less than 40 – Income Less than $100,000 – Gender Male (40-49 – More than $250,000 - Female)	–0.873		14.4						
Age Less than 40 – Income $100,000-$150,000 – Gender Male	–0.768		4.6						
Age Less than 40 – Income $150,000-$200,000 – Gender Male	–0.073		12.8						
Age Less than 40 - Income $200,000-$250,000 – Gender Male	–4.234	*	2.3						
Age 50-59 - Income Less than $100,000 – Gender Male	–0.228		19.9						
Age 50-59 - 100,00-$150,000 – Gender Male	–0.687		4.1						
Age 50-59 - Income $150,000-$200,000 – Gender Male	–1.069		15.9						
Age 50-59 – Income $200,000-$250,000 – Gender Male	–1.840	-	3.7						
Age More than 60 - Income Less than $100,000 – Gender Male	0.471		23.8						
Age More than 60 – Income $100,000-$150,0000 – Gender Male	–0.231		4.6						
Age More than 60 – Income $150,000-$200,000 – Gender Male	0.720		19.4						

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
Age More than 60 – Income $200,000-$250,000 – Gender Male	–1.221		4.9						
Age Less than 40 – Nonmetropolitan – Gender Male (40-49 – MSA – Female)	1.303	***	7.8	0.235		5.5			
Age 50-59 – Nonmetropolitan – Gender Male	0.737	**	7.7	2.050	***	23.4			
Age More than 60 – Nonmetropolitan – Gender Male	–4.135	***	6.9	1.633	***	4.1			
Age Less than 40 – Present Employment Solo or 2 Practice - Gender Male (40-49 – Other – Female)	–0.803		6.1				0.681		2.4
Age Less than 40 – Present Employment Group Practice - Gender Male	0.248		3.8				–0.753		2.8
Age 50-59 – Present Employment Solo or 2 Practice – Gender Male	0.652		5.3				–0.424		1.1
Age 50-59 – Present Employment Group Practice – Gender Male	–0.079		2.0				–0.477		1.0
Age More than 60 – Present Employment Solo or 2 Practice – Gender Male	0.364		4.0				–0.688		0.9
Age More than 60 – Present Employment Group Practice – Gender Male	1.255		2.3				–2.437	-	0.9
Age Less than 40 – Region Northeast – Gender Male (40-49 – South – Female)				–0.170		2.7			
Age Less than 40 – Region North Central – Gender Male				–0.484		1.5			
Age Less than 40 – Region West – Gender Male				–0.688		1.2			
Age 50-59 – Region Northeast – Gender Male				–0.348		2.7			
Age 50-59 – Region North Central – Gender Male				–0.939	*	1.1			
Age 50-59 – Region West – Gender Male				–1.221	*	0.8			
Age More than 60 – Region Northeast – Gender Male				–0.419		2.2			
Age More than 60 – Region North Central – Gender Male				–0.194		2.1			
Age More than 60 – Region West – Gender Male				–0.280		1.9			
Board-Certification –USA/Canada Medical School – Status Ineligible (Not Board-Certified – Other – Refusals)				–0.408		1578.1			
Board-Certification –USA/Canada Medical School – Status Not Located				–3.654	***	18.1			
Board-Certification –USA/Canada Medical School – Present Employment Solo or 2 Practice (Not Board-Certified – Other – Other)	0.544	-	7.1						
Board-Certification –USA/Canada Medical School – Present Employment Group Practice	1.150	*	3.1						
Board-Certification –USA/Canada Medical School – Region Northeast (Not Board-Certified – Other – South)				0.258		607.3	0.043		1.2
Board-Certification –USA/Canada Medical School – Region North Central				0.809	*	498.7	0.050		0.8
Board-Certification –USA/Canada Medical School – Region West				1.311	**	595.9	–0.796	-	1.3
Board-Certification –USA/Canada Medical School – Gender Male (Not Board-Certified – Other – Female)	1.138	***	20.5						
Board-Certification – Status Ineligible – Region Northeast (Not Board-Certified – Refusals – South)				1.467	-	267.2			
Board-Certification – Status Ineligible – Region North Central				1.302	*	113.5			
Board-Certification – Status Ineligible – Region West				1.564	**	104.3			
Board-Certification – Status Not Located – Region North East				–0.507		149.8			
Board-Certification – Status Not Located – Region North Central				–0.430		83.2			

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
Board-Certification – Status Not Located – Region West				–1.249	*	60.9			
Board-Certification – Status Ineligible – Specialty Gen/Fam Practice (Not Board-Certified – Refusals – Surgeons)				–0.033		37.4			
Board-Certification – Status Ineligible – Specialty Internal Medicine				0.168		60.8			
Board-Certification – Status Ineligible – Specialty Pediatrics				–0.231		26.2			
Board-Certification – Status Ineligible – Specialty Psychiatry				0.965		6.4			
Board-Certification – Status Ineligible – Specialty Other Specialties				0.529		45.2			
Board-Certification – Status Not Located – Specialty Gen/Fam Practice				0.735		24.0			
Board-Certification – Status Not Located – Specialty Internal Medicine				1.676		60.3			
Board-Certification – Status Not Located – Specialty Pediatrics				2.384	-	43.6			
Board-Certification – Status Not Located – Specialty Psychiatry				1.039		8.3			
Board-Certification – Status Not Located – Specialty Other Specialties				1.749		30.3			
Board-Certification – Income Less than $100,000 – Region Northeast (Not Board-Certified – More than $250,000 – South)	0.910		62.0						
Board-Certification – Income Less than $100,000 – Region North Central	0.071		27.9						
Board-Certification – Income Less than $100,000 – Region West	1.658	*	45.9						
Board-Certification – Income $100,000-$150,000 – Region Northeast	0.421		19.1						
Board-Certification – Income $100,000-$150,000 – Region North Central	0.647		15.6						
Board-Certification – Income $100,000-$150,000 – Region West	1.337	-	16.2						
Board-Certification – Income $150,000-$200,000 – Region Northeast	1.394	-	8.9						
Board-Certification – Income $150,000-$200,000 – Region North Central	1.076	-	10.2						
Board-Certification – Income $150,000-$200,000 – Region West	1.963	*	10.1						
Board-Certification – Income $200,000-$250,000 – Region Northeast	1.570		152.9						
Board-Certification – Income $200,000-$250,000 – Region North Central	1.223	*	67.0						
Board-Certification – Income $200,000-$250,000 – Region West	1.507	-	65.8						
Board-Certification – Income Less than $100,000 – Specialty Gen/Fam Practice (Not Board-Certified – More Than $250,000 - Pediatrics)	0.288		11.2						
Board-Certification – Income Less than $100,000 – Specialty Internal Medicine	–0.460		3.5						
Board-Certification – Income Less than $100,000 – Specialty Other	1.300		6.7						
Board-Certification – Income $100,000-$150,000 – Specialty Gen/Fam Practice	–1.030		3.8						
Board-Certification – Income $100,000-$150,000 – Specialty Internal Medicine	–1.797	-	1.3						
Board-Certification – Income $100,000-$150,000 – Specialty Other	0.036		2.3						
Board-Certification – Income $150,000-$200,000 – Specialty Gen/Fam Practice	–0.059		1.8						

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
Board-Certification – Income $150,000-$200,000 – Specialty Internal Medicine	–1.532		0.5						
Board-Certification – Income $150,000-$200,000 – Specialty Other	1.049		1.3						
Board-Certification – Income $200,000-$250,000 – Specialty Gen/Fam Practice	–0.236		23.5						
Board-Certification – Income $200,000-$250,000 – Specialty Internal Medicine	–3.811	*	7.7						
Board-Certification – Income $200,000-$250,000 – Specialty Other	–0.877		10.2						
Board-Certification – Income Less than $100,000 – Gender Male (Not Board-Certified – More Than $250,000 – Female)	–1.184		18.9						
Board-Certification – Income $100,000-$150,000 – Gender Male	–0.463		14.2						
Board-Certification – Income $150,000-$200,000 – Gender Male	0.748		25.3						
Board-Certification – Income $200,000-$250,000 – Gender Male	–2.282	*	12.6						
Board-Certification – Nonmetropolitan – Region Northeast (Not Board-Certified – MSA - South)	1.066	***	24.3	2.518	***	170.0			
Board-Certification – Nonmetropolitan – Region North Central	1.297	***	16.2	0.324		51.2			
Board-Certification – Nonmetropolitan – Region West	0.016		31.8	0.611	*	133.1			
Board-Certification – Present Employment Solo or 2 Practice – Region Northeast (Not Board Certified – Other - South)				–0.850	-	24.3			
Board-Certification – Present Employment Solo or 2 Practice – Region North Central				–1.714	***	14.2			
Board-Certification – Present Employment Solo or 2 Practice – Region West				–0.871	*	18.0			
Board-Certification – Present Employment Group Practice – Region Northeast				–0.221		26.7			
Board-Certification – Present Employment Group Practice – Region North Central				0.158		20.3			
Board-Certification – Present Employment Group Practice – Region West				0.236		20.1			
Board-Certification – Present Employment Solo or 2 Practice – Specialty Gen/Fam Practice (Not Board-Certification – Other - Pediatrics)	0.483		1.5						
Board-Certification – Present Employment Solo or 2 Practice – Specialty Internal Medicine	1.460	-	4.0						
Board-Certification – Present Employment Solo or 2 Practice – Other	0.825	-	1.5						
Board-Certification – Present Employment Group Practice – Specialty Gen/Fam Practice	–0.720		0.3						
Board-Certification – Present Employment Group Practice – Specialty Internal Medicine	1.431	-	1.2						
Board-Certification – Present Employment Group Practice – Other	0.043		0.4						
USA/Canada Medical School – Income Less than $100,000 – Gender Male (Other – More Than $250,000 – Female)	0.780		4.6						
USA/Canada Medical School – Income $100,000-$150,000 – Gender Male	0.586		2.0						
USA/Canada Medical School – Income $150,000-$200,000 – Gender Male	–0.223		6.0						
USA/Canada Medical School – Income $200,000-$250,000 – Gender Male	3.030	**	2.1						
USA/Canada Medical School – Nonmetropolitan – Region Northeast (Other – MSA – South)							1.758	**	0.9
USA/Canada Medical School – Nonmetropolitan – Region North Central							–0.575		0.2

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
USA/Canada Medical School – Nonmetropolitan – Region West							–0.218		0.4
USA/Canada Medical School – Present Employment Solo or 2 Practice (Other – Other – South)							0.529		0.5
USA/Canada Medical School – Present Employment Solo or 2 Practice – Region North Central							0.743		0.3
USA/Canada Medical School – Present Employment Solo or 2 Practice – Region West							0.240		0.7
USA/Canada Medical School – Present Employment Group Practice – Region Northeast							1.859		0.7
USA/Canada Medical School – Present Employment Group Practice – Region North Central							–1.114		0.3
USA/Canada Medical School – Present Employment Group Practice – Region West							–1.516	*	0.4
USA/Canada Medical School – Present Employment Solo or 2 Practice – Gender Male (Other – Other – Female)	–0.226		1.0						
USA/Canada Medical School – Present Employment Group Practice – Gender Male	–1.080	**	0.3						
USA/Canada Medical School – Region Northeast – Gender Male (Other – South – Female)	1.307	**	5.0						
USA/Canada Medical School – Region North Central – Gender Male	1.274	*	5.7						
USA/Canada Medical School – Region West – Gender Male	0.989	-	13.3						
Status Ineligible – Present Employment Solo or 2 Practice – Gender Male (Refusals – Other - Female)				–1.670	**	2.7			
Status Ineligible – Present Employment Group Practice – Gender Male				0.252		26.2			
Status Not Located – Present Employment Solo or 2 Practice – Gender Male				–1.751	**	4.3			
Status Not Located – Present Employment Group Practice – Gender Male				–0.940	-	11.9			
Income Less than $100,000 – Present Employment Solo or 2 Practice – Gender Male (More than $250,000 – Other – Female)	0.266		7.1						
Income Less than $100,000 – Present Employment Group Practice – Gender Male	0.339		3.1						
Income $100,000-$150,000 – Present Employment Solo or 2 Practice – Gender Male	0.487		1.8						
Income $100,000-$150,000 – Present Employment Group Practice – Gender Male	0.761		0.7						
Income $150,000-$200,000 – Present Employment Solo or 2 Practice – Gender Male	–0.991		3.1						
Income $150,000-$200,000 – Present Employment Group Practice – Gender Male	–1.333		1.5						
Income $200,000-$250,000 – Present Employment Solo or 2 Practice – Gender Male	1.229		1.1						
Income $200,000-$250,000 – Present Employment Group Practice – Gender Male	0.113		0.6						
Nonmetropolitan – Board-Certification – Region Northeast (MSA – Not Board-Certified – South)							0.931	*	6.4
Nonmetropolitan – Board-Certification – Region North Central							1.036	*	18.1
Nonmetropolitan – Board-Certification – Region West							–0.879		2.9
Nonmetropolitan – Board-Certification – Present Employment Solo or 2 Practice (MSA – Not Board Certified – Other)							–0.757		5.3
Nonmetropolitan – Board-Certification – Present Employment Group Practice							1.658	*	3.2

TABLE V.4 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff.	Sig[b]	Odds Ratio[c]	New Beta Coeff.	Sig[b]	Odds Ratio[c]
Present Employment Solo or 2 Practice – Region North East – Specialty Gen/Fam Practice (Other – South – Pediatrics)	–0.575		3.6						
Present Employment Solo or 2 Practice – Region North East – Specialty Internal Medicine	0.100		7.0						
Present Employment Solo or 2 Practice – Region North East – Other	–1.013	*	5.5						
Present Employment Solo or 2 Practice – Region North Central – Specialty Gen/Fam Practice	–0.297		1.5						
Present Employment Solo or 2 Practice – Region North Central – Specialty Internal Medicine	–0.175		3.9						
Present Employment Solo or 2 Practice – Region North Central – Other	–0.985	-	3.7						
Present Employment Solo or 2 Practice – Region West – Specialty Gen/Fam Practice	–0.523		11.9						
Present Employment Solo or 2 Practice – Region West – Specialty Internal Medicine	–0.483		12.6						
Present Employment Solo or 2 Practice – Region West – Other	–0.504		26.8						
Present Employment Group Practice – Region Northeast – Specialty Gen/Fam Practice	–0.107		0.6						
Present Employment Group Practice – Region Northeast – Specialty Internal Medicine	0.431		1.0						
Present Employment Group Practice – Region North Northeast – Other	–0.701		0.8						
Present Employment Group Practice – Region North Central – Specialty Gen/Fam Practice	0.181		0.3						
Present Employment Group Practice – Region North Central – Specialty Internal Medicine	–0.379		0.4						
Present Employment Group Practice – Region North Central – Other	–1.116	**	0.4						
Present Employment Group Practice – Region West – Specialty Gen/Fam Practice	–0.622		2.2						
Present Employment Group Practice – Region West – Specialty Internal Medicine	0.547		7.3						
Present Employment Group Practice – Region West – Other	–1.236	**	2.7						
Gender Male – Nonmetropolitan – Region Northeast (Female – MSA - South)							–0.072		0.8
Gender Male – Nonmetropolitan – Region North Central							0.471		5.0
Gender Male – Nonmetropolitan – Region West							1.614	-	3.0
Gender Male –USA/Canada Medical School – Age Less than 40 (Female – Other – 40-49)							–0.210		0.8
Gender Male –USA/Canada Medical School – Age 50-59							–0.590		0.4
Gender Male –USA/Canada Medical School – Age More than 60							1.846	*	1.0
R^2 (listed in sig. Column)		0.057			0.179			0.068	

TABLE V.5

RESULTS OF THE RESPONSE MODELING PROCEDURES, BY PANEL, FOR THE SUPPLEMENTAL SAMPLE

Characteristic/Indicator Variable[a]	Reinterview[d]			Noninterview[e]			New[f]		
	Beta Coeff	Sig[b]	Odds Ratio[c]	Beta Coeff	Sig[b]	Odds Ratio[c]	Beta Coeff	Sig[b]	Odds Ratio[c]
Intercept	4.290	***	73.0	2.012	-	7.5	0.485		1.6
Age Less than 40 (40-49)				–4.132			0.153		1.2
Age Less than 50 (50 or Older)	–1.323								
Age 50 or Older				–1.297			0.642	-	1.9
Board-Certification (Not Certified)	–4.102			–3.981			–0.159		
USA/Canada Medical School (Other)	0.141			–2.929					
Status Refusals (Ineligibles and Not Located)				3.315					
Income Less than 100,000 (More than $250,000)	1.165								
Income $100,000-$150,000	1.092								
Income $150,000-$200,000	1.187								
Income $200,000-$250,000	0.158								
Nonmetropolitan (MSA)	–1.268			0.445					
Present Employment Solo or 2 (Other)	–0.934			–3.308					
Present Employment Group	–1.809			–2.961					
Region North East (South)	–1.312			0.120			–0.104		
Region North Central	–2.072			–2.875			–1.200		
Region West	–0.591			0.032			–0.229		
Specialty Gen/Family Practice and Pediatrics (Internal Medicine)	–0.822			1.350			–0.344		
Specialty Specialist	–1.465			1.007			–0.811		
Gender Male (Female)	–1.077			–1.057			–0.377		
Age Less than 40 – Board-Certification (40-49 – Not Certified)				4.499					
Age Less than 50 – Board-Certification (50 or Older)	1.086								
Age 50 or Older – Board-Certification				4.443					

[a]Reference cell is noted in parentheses for all characteristic indicator variables.

[b]The significance levels are noted by: *** the smallest *P* value for the category of predictors smaller that 0.001, ** the smallest *P* value for the category of predictors smaller than 0.01, * the smallest *P* value for the category of predictors smaller than 0.05 and - the smallest *P* value for the category of predictors smaller than 0.1.

[c]The regression models include main effects and second-and third-order interactions. The odds ratio of a second/third order-interaction is computed as the exponential of the sum of the coefficients involved with the second/third-order interaction.

[d]The reinterviews are the physicians who completed Round Two interviews.

[e]The noninterviews are the physicians who were selected for the Round Two sample but did not complete the interview.

[f]The new sample includes physicians in Round Three sampling frame who were not selected for the Round Two sample

TABLE V.5 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff	Sig[b]	Odds Ratio[c]	New[f] Beta Coeff	Sig[b]	Odds Ratio[c]
Age Less than 40 - USA/Canada Medical School (40-49 – Other)				4.051					
Age 50 or Older –USA/Canada Medical School				4.274					
Age Less than 40 – Status Refusals (40-49 – Ineligible and Not Located)				–1.829					
Age 50 or Older – Status Refusals				–3.732					
Age Less than 40 – Nonmetropolitan (40-49 – MSA)				0.298		0.0			
Age 50 or Older – Nonmetropolitan				–3.740	**	0.0			
Age Less than 40 – Present Employment Solo or 2 (40-49 – Other)				1.156					
Age Less than 50 – Present Employment Solo or 2 (50 or Older)	–1.119								
Age Less than 40 – Present Employment Group				1.898					
Age Less than 50 – Present Employment Group	0.654								
Age 50 or Older – Present Employment Solo or 2				2.827					
Age 50 or Older – Present Employment Group				0.242					
Age Less than 40 – Region Northeast (40-49 – South)				–0.330		<0.1			
Age Less than 40 – Region North Central				0.058		<0.1			
Age Less than 40 – Region West				0.351		<0.1			
Age 50 or Older – Region Northeast				–2.235	**	<0.1			
Age 50 or Older – Region North Central				0.157		<0.1			
Age 50 or Older – Region West				–0.540		<0.2			
Age Less than 50 – Specialty Gen/Family Practice (50 or Older – Internal Medicine)	1.288								
Age Less than 50 – Specialty Specialist	1.612								
Age Less than 40 – Gender Male (40-49 – Female)				1.129					
Age 50 or Older – Gender Male				1.411					
Board-Certification – Present Employment Solo or 2 (Not Certified – Other)	1.103		<0.1	1.313	*	<0.1			
Board-Certification – Present Employment Group	2.323	-	<0.1	1.504	-	<0.1			
Board-Certification – Region Northeast (Not Certified – South)	0.951	-	<0.1	0.947		0.1	–0.057		0.7
Board-Certification – Region North Central	0.945		<0.1	2.793	***	<0.1	1.064		0.7
Board-Certification – Region West	0.891		<0.1	0.726		<0.1	–0.253		0.5
Board Certified – Specialty Gen/Family Practice and Pediatrics (Not Certified – Internal Medicine)	1.069								
Board-Certification– Specialty Other	1.323								
Board-Certification – Gender Male (Not Certified – Female)	2.045	**	0.0						
USA/Canada Medical School – Board Certified (Other – Not Certified)	0.759			3.475					

TABLE V.5 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff	Sig[b]	Odds Ratio[c]	New[f] Beta Coeff	Sig[b]	Odds Ratio[c]
USA/Canada Medical School – Nonmetropolitan(Other – MSA)				–2.006	*	<0.1			
USA/Canada Medical School – Present Employment Solo or 2 (Other – Other)	1.851			1.724	*	<0.1			
USA/Canada Medical School – Present Employment Group	2.122			–0.483		<0.1			
USA/Canada Medical School – Region Northeast (Other – South)				–0.447		<0.1			
USA/Canada Medical School – Region North Central				1.302		<0.1			
USA/Canada Medical School – Region West				–2.347	*	<0.1			
Status Refusals – Present Employment Solo or 2 (Ineligible and Not Located - Other)				1.375					
Status Refusals – Present Employment Group				–1.322					
Income Less than $100,000 – Gender Male (More than $250,000 - Female)	–1.313		0.3						
Income $100,000-$150,000 – Gender Male	–1.566	-	0.2						
Income $150,000-$200,000 – Gender Male	–1.113		0.4						
Income $200,000-$250,000 – Gender Male	0.270		0.5						
NonMetropolitan – Specialty Gen/Family Practice and Pediatrics (MSA – Internal Medicine)							–0.706	-	0.3
Nonmetropolitan – Specialty Specialist							–0.125		0.4
Nonmetropolitan – Gender Male (MSA – Female)				1.910	*	3.7			
Nonmetropolitan – Gender Male	1.133	*	0.3						
Present Employment Solo or 2 – Gender Male (Other – Female)				1.164					
Present Employment Group – Gender Male				2.595					
Region Northeast – Specialty Gen/Family Practice and Pediatrics (South – Internal Medicine)				–1.127		1.4	0.420		1.0
Region Northeast – Specialty Specialist				–0.633		1.6	0.130		0.5
Region North Central – Specialty Gen/Family Practice and Pediatrics				–0.906		0.1	0.514		0.4
Region North Central – Specialty Specialist				–1.399		<0.1	0.993	-	0.4
Region West – Specialty Gen/Family Practice and Pediatrics				1.937		27.6	0.819		1.3
Region West – Specialty Specialist				0.893		6.9	0.039		0.4
Region Northeast – Gender Male (South – Female)	0.430		0.1						
Region North Central – Gender Male	1.561	*	0.2						
Region West – Gender Male	–0.234		0.1						
Gender Male – Specialty Gen/Family Practice and Pediatrics (Female – Internal Medicine)							0.652		0.9
Gender Male – Specialty Specialist							0.825	-	0.7
Age Less than 40 – Board-Certification – USA/Canada Medical School (40-49 – Not Certified – Other)				–4.979	**	<0.1			
Age 50 or Older – Board-Certification – USA/Canada Medical School (50 or Older – Not Certified - Other)				–5.988	***	0.1			

TABLE V.5 (*continued*)

Characteristic/Indicator Variable[a]	Reinterview[d] Beta Coeff	Sig[b]	Odds Ratio[c]	Noninterview[e] Beta Coeff	Sig[b]	Odds Ratio[c]	New[f] Beta Coeff	Sig[b]	Odds Ratio[c]
Age Less than 50 – Board-Certification – Present Employment Solo or 2 (50 or Older – Not Certified - Other)	1.909		<0.1						
Age Less than 50 – Board-Certification – Present Employment Group	–0.314		<0.1						
Age Less than 50 – Board-Certification – Specialty Gen/Family Practice and Pediatrics (50 or Older – Not Certified – Internal Medicine)	–1.084		<0.1						
Age Less than 50 – Board-Certification – Specialty Specialist	–1.877		<0.1						
Age Less than 40 – Status Refusals – Present Employment Solo or 2 (40-49 – Ineligibles and Not Located – Other)				–1.278		<0.1			
Age Less than 40 – Status Refusals – Present Employment Group				3.148	*	0.2			
Age 50 or Older – Status Refusals – Present Employment Solo or 2 (50 or Older – Ineligibles and Not Located – Other)				1.640		2.3			
Age 50 or Older – Status Refusals – Present Employment Group				4.091	*	0.2			
Age Less than 40 – Present Employment Solo or 2 – Gender Male (40-49 – Other – Female)				–2.390		<0.1			
Age Less than 40 – Present Employment Group – Gender Male				–2.898		<0.1			
Age 50 or Older – Present Employment Solo or 2 – Gender Male				–5.024	*	<0.1			
Age 50 or Older – Present Employment Group – Gender Male				–2.359		<0.1			
Board-Certification –USA/Canada Medical School – Present Employment Solo or 2 (Not Certified – Other - Other)	–2.597	*	<0.1						
Board-Certification –USA/Canada Medical School – Present Employment Group	–2.951	*	<0.1						
R^2 (listed in Sig. column)		0.063			0.276			0.044	

the significance level and odds ratio[3] are given for the third-order interactions and second-order interactions that are not combinations of the third-order interactions. For each model, we also present the R-square values, with the reminder that small R-square values are the norm in logistic regression with survey data and cannot be interpreted the same as those in linear regression (p. 167 Hosmer and Lemeshow 2000). The goodness-of-fit tests indicated that the models were a reasonable fit. The R-square values were small (as is common for weighted logistic regression models) for some models, with an average value of about 0.05 for the reinterview physicians, 0.20 for the noninterview physicians, and 0.06 for the new physicians for both the location and response models. The R-square value for the noninterview physicians was high because the Round Two survey disposition status explained a major portion of variation. This is, as shown in Appendix C, physicians who refused the Round Two interview or were ineligible were located at a high rate (90 percent or higher), but physicians who could not be located in Round Two had a low location rate (63 to 66 percent).

2. Location Weight Adjustments

The location models provide the probability of locating a physician (location propensity score). The weight adjusted for location is obtained by multiplying the sampling weight and the

[3]The regression models include main effects and second- and third-order interactions. The odds ratio of a second/third-order interaction is computed as the exponential of the addition of the coefficients involved with the second/third-order interaction. For example, if the model is:

$$logit\ P(x) = a_o + a_1x_1 + a_2x_2 + a_3x_1 + a_4x_2 \cdot x_2 + a_5x_2 \cdot x_3 + a_1x_1x_3 + a_7x_1x_2x_3$$

The odds ratio of the third-order interaction is:

$$odds\ ratio(x_y \cdot x_2x_3) = exp(a_1 + a_2 + a_3 + a_4 + a_5 + a_6 + a_7$$

inverse of the location propensity score. These adjustments inflate the weights of the located physicians to compensate for those physicians who were not located.

a. Reinterview Physicians in the Site Sample

A full model for location included main effects for age, region, gender, country of medical school, Round Two income, present employment and board-certification, and associated second-order interactions and had an R^2 of 0.017. The reduced model was found by eliminating the nonsignificant variables. The reduced model had an R^2 of 0.016, 5 second-order interactions, and the same main effects as the full model, except for gender. The fact that 98.5 percent of the physicians in this stratum were located may explain why the model is somewhat weak. Table V.2 shows the beta coefficients, significance level and adds ratio of the reduced model.

The final logistic regression model for location showed that the higher location rates are among those physicians who live in the Northeast and earned from $100,000 to $150,000 (odds ratio 38); those physicians living in the Northeast who are at least 50 years old (odds ratio 32); those physicians in the Northeast who earned more than $150,000 (odds ratio 15); those physicians living in the North Central who earned more than $150,000 (odds ratio 11); those physicians in the North Central who earned from $100,000 to $150,000 (odds ratio 9); and those physicians in the Northeast who are from 40 to 49 years old (odds ratio 6).

b. Round Two Noninterview Physicians in the Site Sample

As shown in Table V.2, the reduced model for location including the main effects of age, region, gender, country of medical school, present employment, specialty, urban/rural, Round Two survey disposition status, and board-certification. This model included five second-order interactions, seven third-order interactions, and second-order interactions that are combinations from the third-order interactions, and the reduced model was fit with an R^2 of 0.175. The R-

square of this model is high because the survey disposition status from Round Two is a very significant variable in the model. Table V.2 contains details of the model.

The final logistic regression model for location showed that (1) the highest odds ratio for location is among those physicians who were located and refused to complete the interview in Round Two, are board-certified, and practice in a solo or two-person practice, (2) the second-highest odds ratio for location in this stratum is among the physicians who were not located in the previous round, are board-certified, and practice in a group, (3) the third-highest odds ratio is among the physicians who were not located in the previous round, are board-certified, and practice in a solo or two-person partnership, and the (4) fourth-highest odds ratio is among those physicians who were located in the previous round but refuse to complete the interview, graduated from a medical school in the United States, and work in a group practice.

c. New Physicians in the Site Sample

The full model for location had the main effects of age, region, gender, country of medical school, present employment, specialty, urban/rural, and board-certification, and second- and third-order interactions. This model had an R^2 of 0.052. The reduced model had an R^2 of 0.050. The reduced model included seven third-order interactions, three second-order interactions, and second-order interactions that are combinations of the third-order interactions, and the main effects. Table V.2 shows the beta coefficients. The significance o the coefficient, and the odds ratio of the reduced model.

The final logistic regression model for location showed the highest odds ratios for location among male physicians who work in a solo or two-physician practice and are board-certified (odds ratio 20). Next were those physicians who are specialists, are board-certified, and were graduated in the United States (odds ratio 4); those physicians who live in the North Central and

are board-certified (odds ratio 4); those male physicians who are board-certified and work in a group practice (odds ratio 3); those male physicians who are 50 years old or older and are board-certified (odds ratio 3); and those pediatricians who were graduated in the United States and live in the Northeast (odds ratio 3).

d. Round Two Noninterview Physicians in the Supplement Sample

A full model for location with main effects of age, gender, country of medical school, present employment, specialty, board-certification, and Round Two survey disposition status, and second- and third-order interactions was fit with an R^2 of 0.169. As shown in Table V.3, the reduced model had an R^2 of 0.158, and included one third-order interaction, three second-order interactions, and second-order interactions that are combinations from the third-order interaction, and the main effects. In the reduced model, present employment was not used as a main effect.

The final logistic regression model for location showed that the higher odds ratio for location are among those physicians who were not located in the Round Two and are 45 years old or older (odds ratio 45) and among those male physicians who are specialists (odds ratio 7).

e. New Physicians in the Supplement Sample

The reduced model, with an R^2 of 0.069 had one second-order interaction and the main effects (age, gender, country of medical school, present employment, and board-certification).

Table V.3 shows the final logistic regression model for location. The higher odds ratio for location in the reduced model are among male physicians who are board-certified (odds ratio 3.2); physicians who are 45 years old or older (odds ratio 2.6); and physicians who graduated from a United States/Canada medical school (odds ratio (2.5).

3. Response Weight Adjustments

The response models provide the probability that a physician completes the interview (response propensity score). The final weight adjusted for nonresponse is obtained by multiplying the weight adjusted for location by the inverse of the response propensity score. These adjustments inflate the weights of the physicians who completed the interview to compensate for the ones who did not complete it.

a. Reinterview Physicians in the Site Sample

A full model for response with main effects of age, gender, country of medical school, present employment, Round Two income, specialty, board-certification, region, and urban/rural, and second- and third-order interactions was fit with an R^2 of 0.057. As shown in Table V.4 the reduced model also had an R^2 of 0.057. This reduced model had 18 third-order interactions, two second-order interactions, and second-order interactions that are combinations from the third-order interaction, and the main effects.

The final logistic regression model for response showed that the higher response rates are among noninterview physicians who are more than 60 years old, and the response rate is even higher if the physician is more than 60 years old and living in a nonmetropolitan area; physicians who are board-certified, especially those with an income less than $100,000 a year; and those physicians who are board-certified and earn between $200,000 and $250,000 a year.

b. Round Two Noninterview Physicians in the Site Sample

The reduced model had an R^2 of 0.179 as shown in Table V.4 and included 14 third-order interactions, nine second-order interactions, and second-order interactions that are combinations from the third-order interaction, and the main effects. The main effects included age, gender,

country of medical school, present employment, specialty, board certification, Round Two survey disposition status, region, and urban/rural.

The final logistic regression model for response showed that the higher response rates are among physicians who are board-certified and were graduated from a United States/Canada medical school. The physicians who were ineligibles in the Round Two survey, besides being board-certified and graduates of a United States/Canada medical school, are still more likely to respond than if they were not ineligible (refusals and not located) in Round Two.

c. New Physicians in the Site Sample

A full model for response for the new physician used only frame data (including the main effects of age, gender, country of medical school, present employment, specialty, board-certification, region, and urban/rural, and second- and third-order interactions). The full model had an R^2 of 0.074. The reduced model, as shown in Table V.4, had an R^2 of 0.068. The reduced model had eight third-order interactions, five second-order interactions, and second-order interactions that are combinations from the third-order interactions, and the main effects.

The final logistic regression model for response showed that the higher response is among physicians in nonmetropolitan areas who are board-certified and live in the North Central (odds ratio 18.1); doctors who live in the Northeast in nonmetropolitan areas and are board-certified (odds ratio 6.4); doctors who are younger than 40 and live in nonmetropolitan areas (odds ratio 6.2).

d. Reinterview Physicians in the Supplement Sample

In Table V.5, we summarized the results for the supplemental sample, the reduced model had an R^2 of 0.063. The reduced model included three third-order interactions, five second-order interactions, and second-order interactions that are combinations from the third-order

interactions, and the main effects (age, gender, country of medical school, present employment, income, specialty, board-certification, region, and urban/rural).

The final logistic regression model for response showed that the higher response rates are among male physicians who earn less than $250,000, male physicians who live in nonmetropolitan areas, and male physicians who live in the North Central region.

e. Round Two Noninterview Physicians in the Supplement Sample

The reduced model for response included the main effects of age, gender, country of medical school, present employment, specialty, board-certification, Round Two survey disposition status, region, and urban/rural, one third-order interaction, 12 second-order interactions, and second-order interactions that are combinations from the third-order interactions (see Table V.5). The reduced model had an R^2 of 0.276 (still very high).

The final logistic regression model for response showed that the higher response rates are among physicians who live in the West and practice general, internal medicine or pediatric medicine (odds ratio 28).

f. New Physicians in the Supplement Sample

A reduced model for response was fit with main effects of gender, specialty, board-certification, and region. The reduced model had an R^2 of 0.044, four second-order interactions, and main effects.

The final logistic regression model for response showed that the higher response rates are among physicians who are 50 years or older (odds ratio 1.9) and among those physicians who live in the West and work in general/family practice or as pediatricians (odds ratio 1.3).

E. FINAL COMPUTATION OF THE WEIGHTS

The objectives when computing the national weights are (1) to minimize the risk of introducing bias on the sample estimates, and (2) to reduce the design effect of the sample estimates. Then, after applying the nonresponse adjustments, poststratification is needed to match the adjusted weights to the population totals of the Round Three frame, as well as to trim the weights to avoid large weight values.

In the next sections, a brief explanation is given to understand poststratification and trimming, for the site weights, the panel weights, the augmented weights, and the combined weights.

1. Poststratification and Ratio-Type Adjustments

After the adjustments to the weights for unlocated physicians and for nonresponse among located physicians were applied, the weighted counts for physicians who completed the interviews or who were ineligible did not reproduce the Round Three frame totals for some of the primary analytic domains of PCP/specialists and sampling frame. Therefore, before adjusting for geographic misclassification, we computed a ratio-type adjustment so that the sum of the nonresponse-adjusted weights matched the frame counts. In general, these adjustments were the frame count for a group divided by the corresponding sum of the nonresponse-adjusted weights for the completed and ineligible interviews in the group. Table V.6 presents the cell definitions used to poststratify or ratio-adjust each type of survey weight.[4]

Patient care classification (PCP or specialist) was a key variable; we used this characteristic in all the poststratification adjustments. We prepared the adjustments for each sample separately

[4]The national combined weight was not poststratified; the site and supplement components were separately poststratified and combined using a compositing factor.

TABLE V.6

POSTSTRATIFICATION AND RATIO-TYPE ADJUSTMENTS
FOR NATIONAL AND SITE ESTIMATES WEIGHTS

Weight Name	Analytic Purpose of Weight	Poststratification and Ratio-Adjustment Methodology
PHYWGT2	National estimates from site sample	Four cells defined by PCP/specialist and Round Two frame versus new physicians to Round Three frame
PHYWGT4	National estimates from supplemental sample	Four cells defined by PCP/specialist and Round Two frame versus new physicians to Round Three frame
PHYWGT1	Site-level estimates from site sample	Weights ratio-adjusted to projected count of eligible physicians on a 120-cell basis. The 120 cells defined on combination of PCP/specialist status and site membership[a]

[a]For consistency with the changes in sites, site membership was defined as the physicians' site membership reported during the interview, rather than as the site membership at the time of sample selection.

and then used them to prepare the adjustments for the augmented site sample weights. For the national estimates from the site sample, we poststratified the weights to the frame counts generally using the combination of PCP/specialist status and sample frame characteristic (physicians in Round Two frame versus physicians only in the Round Three frame).

For the supplemental sample, we also used combination of PCP/specialist status and sample frame characteristic of physicians in Round Two frame versus physicians only in the Round Three frame (4 cells). We used these totals because they were known counts.

2. Trimming the Weights Adjusted for Nonresponse

After the national population estimates were developed, we trimmed the weights to address the potential of extreme weights that can inflate the sampling variance of survey estimates. This process identified weights to be trimmed and distributed the trimmed excess among the weights that were not trimmed. The statistical measure of the impact of the trimming was based on the design effect attributable to the variation in the sampling weights. The design effect attributable to weighting is a measure of the potential loss in precision caused by the variation in the sampling weights relative to a sample of the same size with equal weights. We trimmed sampling weights to reduce the design effect. The weight for national-level estimates was trimmed for 0.14 percent of the physicians in the site sample and 1.14 percent of the physicians in the supplement sample.

Table V.7 presents the range in the propensity scores for each of the 11 models after poststratification and trimming. As expected, we found the largest nonresponse adjustments for the Round Two noninterview physicians, since this group had a very low response rate (38 percent) and large response adjustments (the average adjustment was around 2.6).

Table V.8 shows the impact of nonresponse poststratification adjustments on the design effects based on the variability in the survey weights. Most of the increase in design effects

TABLE V.7

SUMMARY OF PROPENSITY SCORE ADJUSTMENTS, BY SAMPLE TYPE AND PANEL

		Site Sample		Supplemental Sample	
		Combined Adjustment Factor[a]		Combined Adjustment Factor[a]	
Panel	PCP Status	Minimum	Maximum	Minimum	Maximum
Reinterview	PCP	0.99	3.95	1.03	2.08
	Specialist	1.04	3.64	1.04	2.19
Noninterview	PCP	1.09	13.25	1.10	6.92
	Specialist	1.08	26.99	1.08	7.70
New Cases	PCP	0.99	7.28	1.35	4.47
	Specialist	0.84	4.68	1.06	3.09

[a]The combined adjustment factor is the product of the inverse of the propensity score for the location model and the inverse of the propensity score for the response model. For the reinterview physicians in the supplemental sample, the factor is the inverse of the propensity score from the combined single logistic model, which accounted for both location and response.

TABLE V.8

SUMMARY OF PROPENSITY SCORE ADJUSTMENTS BY SAMPLE TYPE AND PANEL

	Site Sample		Supplement Sample	
	Design Effect	Percentage Change in Design Effect from Initial Weights	Design Effect	Percentage Change in Design Effect from Initial Weights
Initial Weights	1.78		1.06	
Weights with Non-Response Adjustment	2.42	35.9	1.69	60.0
Weights After Poststratification	2.52	41.7	1.68	59.6
Weights After Trimming	2.40	34.7	1.57	48.6

occurs after the nonresponse adjustments, increasing from 1.78 to 2.42 in the site sample and from 1.06 to 1.69 in the supplement sample. The designs effects increase slightly more after poststratification but are reduced by trimming. The final design effect is 2.40 for the site sample and 1.57 for the supplemental sample.

3. Site Estimate Adjustments

Site estimates were desired on the basis of the physician's practice, but the site assignment at the time of sample selection may have been based on the physician's home address. Physicians who were misclassified were called *movers,* and we had to account for this misclassification in the physician's weights and for site estimates of the eligible physician population.

The weights from the site sample (PHYWGT1 and PHYWGT5), adjusted for nonresponse and ratio-adjusted to site totals provided the basis in part for estimating the number of physicians in each site. Physicians who indicated during the interview that their office was located in a site other than the one recorded at the time of selection were classified as *out-movers*. Out-movers residing in one of the other 60 sites were defined as *in-movers* to that site. Out-movers who were not in one of the 60 sites were not used in the site estimates. In preparing initial site estimate totals, we excluded the out-movers and included the in-movers. Hence, in comparison with the weighted count in each site based on the sample frame (frame estimate), the omission of the out-movers deflated the value for the estimate based on the Round Three survey (survey estimate), and the in-movers increased the value.

Because in-movers had a potentially substantial impact on the survey estimate, we reviewed the estimate and adjusted it. First, in-movers generally had larger weights relative to non-movers

(physicians who were correctly assigned to the site), because the weights for the in-movers also included a component to account for the joint selection of the two sites involved.[5] Second, if a physician from a low-intensity site (with a fairly large weight) was reclassified into a high-intensity site (with a lower weight), the weight for that in-mover might have been substantially larger than the weight for a non-mover. Although the resulting variability in the weights can be substantially increased, there were few such cases, so their impact on sampling variability was manageable. We therefore decided to review the changes in the site estimates as a function of the in-movers, and to smooth the changes when the impacts appeared to be excessive and were based on few cases.

Because the weight from the augmented site sample (PHYWGT5) provided the best site estimates (the largest sample sizes), we used it to review the impact of in-movers on the survey site estimates using this weight. We then used the poststratification procedures described in Section D.2 to adjust the weight (for the site sample only cases [PHYWGT1]) to match the final adjusted site estimates from the augmented site sample. In the review, we computed for each site and PCP/specialist status combination (120 cells) the percentage of the total weight accounted for by the in-movers, and the average percentage of the total weight accounted for by each individual in-mover.

We also computed a trimming criterion value (the "NAEP" value) associated with the weights. The NAEP weight-trimming algorithm compared each weight with the square root of the average value of the squared weight (Potter 1990):

[5]The in-movers usually have a larger weight relative to static site cases and out-movers, because an in-mover must have had original (frame) and current (survey) site membership in 2 of the selected 60 sites. As such, we adjusted the probabilities of selection for these cases to account for the joint selection probabilities of the two sites involved (see Section IV.2).

(5) *NAEP = SQRT [c * (Sum of squared weights)/ n]*,

where c = 10 and n is the size of the subgroup. This trimming criterion suggested a maximum weight value for the cell.

This process introduced a small downward bias in estimated population totals, because the truncated values were not redistributed, and the potential for bias is greatest in those sites with in-movers (not a uniform bias). Therefore, this estimator is downward biased, and the estimator based on untrimmed weights is unbiased but has large standard error, especially at the site level. Hence, we developed a number of other estimators, seeking estimates that would be more stable and conditionally unbiased (certain assumptions needed for unbiasedness) and that would also be reasonably consistent with frame counts and prior survey estimates. An average of five such estimators and the unbiased, direct expansion estimator were obtained for each site. We then adjusted these values to be consistent to the national level weights.

These five ratio estimators use, in different forms, three different estimated percentages of eligible physicians by site and PCP/ specialist (as a percentage of frame counts):

- P_t, the overall percentage of eligible physicians
- P_o, the percentage of eligible physicians among the physicians on the Round Two frame
- P_n, the percentage of eligible physicians among those new to the frame in Round Three

Appendix B.3 presents the details of the estimators. Because these adjustments reduced population totals by about 10 percent, we reviewed other sources as potential candidates for poststratification at the site level (we discuss these sources below). However, none is sufficiently consistent with the CTS definitions to be used for poststratification at either the national or the site level.

For example, Kletke projects the supply of physicians from 1998 to 2020 in the 2000 issue of *Physician Characteristics and Distribution in the U.S.* (American Medical Association 2000). The projections are model-based and produce three levels that vary according to different sets of assumptions (similar to different levels in census projections of the U.S. population). This is essentially a labor force projection and as such is substantially higher (about 50 percent) than the CTS physician totals. These estimates are limited to only allopathic physicians and use the AMA Physicians Masterfile for the size and composition of the physician population. This study indicates a 1.5 percent increase per year.

We used the *Area Resource File* (ARF), which compiles health-related statistics from myriad sources (primarily the U.S. Census and the National Center for Health Statistics), to summarize physician counts by the CTS sites. The summary, similar to CTS, excludes anesthesiologists, radiologists, pathologists, and residents. The counts are mostly about 30 percent higher than the CTS counts but range from slightly lower to 90 percent higher (due to large net in-movers). We feel that these levels, like those in the Kletke paper, are overly influenced by AMA Masterfile counts, for which we have found only about 70 to 80 percent are eligible for the CTS (and this varies considerably among sites and strata). Also, because of the AMA Masterfile linkage, the ARF numbers presumably do not account for the movers.

4. Site Weight Trimming

After developing the site population estimates, we conducted a second round of trimming to address the potential of extreme weights that inflate the sampling variance of survey estimates.

The second round of weight trimming identified weights to be trimmed and distributed the trimmed excess among the weights that were not trimmed. The statistical measure of the impact of the trimming was based on the design effect attributable to the variation in the sampling weights. The design effect attributable to weighting is a measure of the potential loss in

precision caused by the variation in the sampling weights relative to a sample of the same size with equal weights. Sampling weights were trimmed to reduce this design effect. While weight trimming does introduce the potential for introducing bias into the sample estimates, we minimized the number of weights trimming to avoid this problem (that is, trimming was limited to ensure a minimal effect on survey estimates). We trimmed the weight for site-level estimates for 2.56 percent of the physicians.

5. Panel Weights

Some physicians responded to both Round Two and Round Three. The panel represents a valid probability sample of physicians, because nearly all the responding Round Two physicians were selected for Round Three, and a high percentage of those selected responded in the third round (see Chapter IV). We based the inferential population on the Round Two population, so we adjusted the physician weights for the Round Three site and supplemental samples to account for Round Three sampling rates among physicians who responded in Round Two. We then adjusted these weights by the Round Three nonresponse adjustment factors among these physicians. These adjusted weights were then ratio-adjusted, using a raking procedure to the Round Two totals for various factors (see Table V.11).

Table V.12 presents the initial total sum of the weights of the physicians in Round Three who completed a Round Two interview and the total sum of the weights of Round Three after each of the three adjustments used to finalize the panel weights. The first adjustment accounts for the number of physicians who completed the interview in Round Two and were not interviewed in Round Three. The first adjustment inflated 8 percent of the total sum of the weights in the site sample and 4 percent of the total sum of the weights in the supplement

TABLE V.11

ROUND TWO AND THREE QUESTIONNAIRE ITEMS USED IN RAKING PROCEDURES

Item	Categories
IMGUSPR: Foreign Medical School Graduate	2 (Yes/No)
GENDER	2 (Male, Female)
DOCTYP: Doctor Type	2 (MD, DO)
SPECX: Specialty and Subspecialty	7 Categories
CARSAT: Overall Career Satisfaction	5-Point Scale Rating/5 Categories
HRFREEC: Hours of Charity Care	4 Ranges
OWNPR: Ownership Status	3 Categories (Full/Part/Not an Owner)
PRACTICE: Practice Type	10 Categories 1 = Solo 2 = Partnership 3 = Small Group 4 = Medium Group 5 = Large Group 6 = HMO Group 7 = Medical School 8 = Hospital 9 = Local Government 10 = Freestanding Clinic
EFPROFL: Effect of Practice Profile Result	5 Categories
CLNFREE: Freedom for Clinical Decisions	5-Point Scale Rating/5 Categories
HIGHCAR: Possibility of High-Quality Care	5-Point Scale Rating/5 Categories
OBREFS: Referrals to Quality Specialists	6 Categories
OBUTPT: High-Quality Outpatient Mental Health Care	6 Categories
SALWAGE: Salary Compensation	2 Categories 1=Fixed Salary, Not Eligible for Bonus 2=Fixed Salary, Eligible for Bonus
PMCAREC: % Payment Medicare	5 Ranges
PMCAIDC: % Payment Medicaid	5 Ranges
PCAPREVC: % Revenue Pre-Pay Capitation	4 Categories
NMCCONC: # Managed Care Clinics	5 Categories
PMCC: % Revenue Managed Care	5 Categories
SSAT: Patient Satisfaction Affects Compensation	2 Categories
PCTINCNC: Income Category Includes Bonus	3 Categories
YRPRACC: Years in Practice	3 Categories
INCOMEC: Physician's Own Net Income from Medical Practice(s)	5 Categories
PCP Status	2 Categories (PCP, specialist)
Total Constraints	**104 Unique Category Targets**

TABLE V.12

WEIGHTED COUNTS FOR PHYSICIANS PARTICIPATING
IN ROUNDS TWO AND THREE

	Weighted Sample	
Weight	Site Survey	Supplemental Survey
Initial weights	242,718	263,553
Weights after sampling adjustment	262,638	272,852
Weights after nonresponse adjustment	330,545	334,664
Weights after raking adjustment	363,374	363,374

sample. The second adjustment accounts for the Round Three physicians who were sampled but were not located or did not complete the interview. The second adjustment multiplies the weights already adjusted with the first adjustment with the inverse of the combined propensity score for location and response. The total sum of the weights was inflated 26 percent for the site sample and 23 percent for the supplemental sample with the second adjustment.

The third adjustment accounts for the ineligible physicians. For this last adjustment, we used a weighted raking procedure that inflated 10 percent of the total sum of the weights for the site sample and 9 percent of the total weights for the supplemental sample. In addition, the raking procedure adjusted the survey weights for the Round Three eligible completes so that the weighted distribution for a specified set of Round Two survey items would match the reported results from the Round Two analysis. This weighted raking procedure iterates as many times as necessary till the sum of the weights for each set are matched. Table V.11 shows the survey items used in the raking procedure for the site and supplemental samples.

6. Augmented Weights

The augmented weights are the best option for site-specific estimates, because the samples include additional cases from the supplemental ample. The supplemental sample is a small, nationally representative sample of physicians randomly selected from the 48 contiguous states and the District of Columbia. The supplemental sample contains physicians practicing in the 60 site-sampled communities, because about half the U.S. physicians are located in the 60 sites of the site sample.

The augmented weights include the site-sampled cases and the supplemental sampled cases that are practicing in the 60 sites studied in the site sample.

a. Site-Specific Estimates (PHYWGT5)

The site-specific estimates are computed with the site-specific site sample weights (PHYWGT1) and the supplemental weights of the physicians who practice in the 60 sites (PHYWGT4). The site-specific site sample weights are aligned to the eligible physicians in the 60 sites in combination of their physician classification (PCP/specialist) status. The physicians in the supplemental sample being used in the site-specific augmented site sample weights are aligned on the same 120-cell basis (PCP/specialist status and site membership) of the eligible totals for each cell. The two weights are combined by:

(6) $PHYWGT5=n_{site}/(n_{site}+n_{supplement})*PHYWGT1$ *for the site weights*

(7) $PHYWGT5=n_{supplement}/(n_{site}+n_{supplement})*PHYWGT4$ *for the supplement weights*

The site-specific augmented site weights are already poststratified to the eligible totals of the 120 cells.

b. National estimates

For the national estimates, the augmented site sample (PHYWGT7) had the largest sample size and provided the most precise estimate of the eligible physician population weights for the site sample and the supplemental sample. We computed the national estimates from the augmented site weights using the national estimates of the site sample weights (PHYWGT2) and the supplemental weights (PHYWGT4) of those physicians in the supplemental sample that practice in the 60. We adjusted the national estimates of the site sample weights for movers and combined the two sets of weights with the same equation used for the site estimates (equations 6 and 7).

7. National Analysis Based on Combined Site and Supplemental Samples

We used a strategy of combining the two sample components by adjusting the weight for each sample so that the sum of the weights across the two samples would equal the population total. We designed this effort to identify one or more values of a scaling factor (called lambda) that we could use to combine the weights from each sample component and achieve the best estimates with nearly minimal sampling variances for these estimates. It also was designed to reduce the amount of computer processing. Conceptually, any value of lambda would result in unbiased estimates, but the best point estimate would be associated with the value of lambda that achieved the minimum variance. The effort therefore was directed at identifying a value of lambda that achieved the smallest variance estimates across different subpopulations and analysis variables.

The estimation of the scaling factor used variance estimates computed for the site and supplemental components for multiple subpopulations and for both continuous and categorical analysis variables (11 populations and 22 variables). We computed values of lambda directly from the variance estimates. The lambda values were evaluated first by assessing the distribution of the lambdas and determining factors explaining the variation in the lambda values and then by assessing the effect of different lambda values on the point estimate and the variance estimates for the subpopulations and analysis variables. For the physician survey, we estimated the lambda value from the average of the medians for 10 subpopulations of physicians.

With these procedures, a single value of lambda of 0.8778 was identified for the physician survey. (The Round Three value for lambda is virtually the same as the Round Two value of 0.8742). This value achieved the desired level of sampling variances and simplified the processing of all estimates.

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