Evaluating Retention in BCRS Programs

Final Report

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NATIONAL HEALTH SERVICE CORPS

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EXECUTIVE SUMMARY

Through its 40-year history, the National Health Service Corps (NHSC) has supported more than 40,000 primary care, mental health and dental health clinicians with scholarships and loan repayment incentives to work in Health Professional Shortage Areas. Retaining these clinicians after they complete their service commitments (which are typically 2-5 years) is key to the NHSC's lasting impact on underserved communities and for further leveraging the Federal investment to expand access to care. The Bureau of Clinician Recruitment and Service, the NHSC's parent agency, commissioned this study to assess retention rates for recent NHSC clinicians after they complete their service contracts and to compare these recent retention rates to the rates documented in the NHSC's last extensive retention survey in 1998. The current study was to assess retention in the short-term (1 month to 1 year after service terms are completed), mid-term (2-5 years) and long-term (7-12 years), and to identify the factors associated with higher retention rates over time. Retention was assessed with respect to remaining within the practice where the clinician served while in the NHSC and also with respect to working in the broader set of practices that focus on care for the underserved.

In this study's questionnaire, current and past NHSC clinicians responded to questions about their backgrounds, NHSC practices and experiences, and subsequent careers. Three NHSC clinician cohorts were surveyed in 2011: (1) those who were serving in 1998 and had responded to the previous retention survey ("Remote Alumni"), (2) clinicians who were serving in 2005 ("Recent Alumni"), and (3) clinicians who were serving in 2010, most of whom were still serving when surveyed in 2011 ("Current Clinicians").

Key findings:

- **The short-term retention rates of NHSC clinicians have increased over the decades.** In the NHSC's previous retention evaluation, it was found that 26% of NHSC clinicians from the 1980s and early 1990s remained in their service sites one-month or more beyond their service terms. The current study found that a much greater 71% of 1998 alumni and 80% of 2005 alumni remained in their service sites one month or more beyond their service terms. Increases were also seen in retention working within practices that focused on care of the underserved one or more months beyond service terms: this was previously reported at 64% for alumni of the 1980s and early 1990s, and in the current study was shown to be 72% for 1998 alumni and 82% for 2005 alumni.
- **Medium-term retention of NHSC clinicians is now relatively high and comparable for 1998 and 2005 alumni.** Nearly half (48%) of the 1998 alumni remained in their NHSC service sites for two years or more beyond their service terms, and over two-thirds (68%) continued to work in practices that focused on care for the underserved for at least two years. Among the more recent, 2005 alumni, a comparable 46% remained in their NHSC service sites at least two years after their service terms and 65% were still working in practices focused on care for the underserved.
- **Long-term retention—The 1998 Remote Alumni experienced a gradual attrition from their NHSC service sites over the long-term; at 10 years almost one in five (18%) remained at their service sites and over half (55%) were still working in practices that focused on care for the underserved.**

- **Among alumni from both 1998 and 2005, retention rates within service sites at all points in time were substantially higher for participants of the NHSC Loan Repayment than Scholarship Program. Loan Repayment Program alumni from 2005 also demonstrated higher retention rates than Scholarship Program alumni within practices that focused on care for the underserved.**
- **Among disciplines participating in the NHSC in 1998, retention rates at virtually all points in time within NHSC service sites and also in underserved-focused practices were highest for physicians and lowest for physician assistants. Among the greater number of disciplines participating in 2005, retention rates were highest for the mental health disciplines as a group and lowest for dentists.**
- **Among NHSC clinicians serving in 1998, retention rates were higher in the short, medium and long-term for those who served in rural as opposed to urban communities. Among clinicians serving in 2005, retention rates were comparable for those in rural, urban and frontier areas.**
- **Statistical modeling used to assess the complex interplay of individual, organizational and community factors suggests that retention in the medium term within NHSC service sites is affected not only by which program the clinician participates in—with retention rates in the Loan Repayment Program being greater than Scholarship Program—but also by the clinician's fit with their site.** Serving in a busy, well-regarded practice in a familiar community (e.g., in a state where the clinician grew up or trained) and where the clinician feels their professional, personal and family needs are well met is associated with higher medium-term and generally also long-term site retention.
- **Still working in practices that focus on underserved care 10 years beyond the NHSC service term was more common for clinicians who, when first applying to the NHSC, were strongly motivated to work in underserved areas and for those who served in busy practice settings.**
- **Medium-term retention rates are significantly higher among those who report positive attitudes and positive experiences with the NHSC program.** Remaining two years or longer within one's NHSC service site and within practices focused on care for the underserved was more common for clinicians who: (1) were more satisfied with the contacts and support they received from NHSC staff; (2) felt more appreciated by NHSC staff; (3) reported higher overall satisfaction with the NHSC experience and (4) reported that their Loan Repayment or Scholar Program "exceeded expectations."

These data suggest that as the NHSC moves into its fifth decade of service, its clinicians are now remaining for significant periods of time in their service sites and especially within the broader group of practices that focus on care of the underserved. Still, retention can be further improved and the NHSC's impact made even longer lasting. This study identified factors important to the retention of NHSC clinicians, which are generally consistent with those identified in the previous, 1998 study of retention for the NHSC and also consistent with studies of retention for other clinicians working in underserved areas. Recommendations are made here for how to address these identified factors to help further extend retention among NHSC clinicians in the future.

PROJECT PURPOSE

The National Health Service Corps (NHSC) is the largest, most visible and most often lauded federal program created to help the health of medically underserved communities by addressing the maldistribution of health care practitioners. In its now 40 year history, the NHSC has supported over 40,000 primary care, mental and behavioral health and dental health clinicians serving in Health Professional Shortage Ares (HPSAs). The past three years—since 2008—have been of particular importance to the NHSC and the communities it serves, as its workforce has grown to more than twice its previous size—now over 10,000 clinicians—with resources from the American Recovery and Reinvestment and Affordable Care Acts. Its visibility to young clinicians and to shortage area communities and practices has likely never been greater.

The NHSC recognizes that its role is more than simply supporting clinicians in shortage area practices during the first few years of their careers. Retaining clinicians longer term is also central to the NHSC's mission and to its impact on communities. The NHSC's contributions to the practitioner needs of typically poor and sometimes geographically remote communities are greater when its clinicians remain in their service practices after their contracted service term is completed. The program's impact is doubled if clinicians supported with a two-year loan repayment award remain in their service sites on average for another two years beyond their award term. And if clinicians remained another two years more their contributions to their communities would be still another 50% more. Not all NHSC clinicians and their families will choose to remain in their service sites and some will move on to other practices serving at-risk populations, which also fosters the NHSC's mission.

Retention is now receiving renewed attention within the NHSC to help assure that its recent growth and investment have a lasting effect on underserved communities. To support these efforts, the NHSC wants to know, with recent data: Which clinician disciplines supported by the NHSC tend to remain longer in service to the underserved? What is the retention difference between participants of the Scholarship and Loan Repayment Program, and what accounts for this difference? How can a well-fitting match between a clinician and community be fostered to promote retention? What is it about practices and communities that can help retain NHSC clinicians beyond their service time, and conversely, what is it about some practices and communities that seemingly drives clinicians away? And what can the NHSC do to help maximize the retention of its clinicians, whether within their service sites or in ongoing care in other underserved communities?

The last NHSC-commissioned study to broadly assess the retention of NHSC physicians was carried out about a dozen years ago (Konrad et al 2000). That 1998 study surveyed clinicians serving then in the NHSC and also alumni. That study provided useful insights on the retention experiences of clinicians serving in the NHSC in the 1980s and early 1990s. The NHSC and its parent organization, the Bureau of Clinician Recruitment and Service (BCRS) within the Health Resources and Services Administration (HRSA), recently commissioned this project to, in-part, replicate and also go beyond that earlier study, to measure retention for more recent cohorts of NHSC clinicians and reassess the factors that can be addressed to promote retention and maximize program impact.

Project Charge

This project's purpose and scope of work, as stated within its original Request for Task Order July 21, 2010, are as follows:

> The purpose of this contract is to evaluate program performance within the NHSC as it relates to the retention of clinicians by discipline. The data generated will allow us to identify program strengths and create a platform to develop strategies for improvement.
>
> The project will focus primarily on gathering data from NHSC alumni, NHSC clinicians in service, and NHSC site coordinators past and present through a series of surveys. The surveys will be analyzed, utilizing epidemiological metrics from the previous retention report for comparison purposes but not limited to those metrics exclusively. The surveys will allow us to compile current retention data and compare it with data from current efforts related to clinician satisfaction.

Study Questions

The original Task Order request specified 21 questions to be addressed in this project. These questions were subsequently collapsed and modified for clarity and feasibility in a post-award meeting of staff from the project and the BCRS. The study questions were further amended for greater focus by project and BCRS staff when data collection was complete in February of 2012. The final, regrouped set of questions to be addressed in this project is as follows:

1. How long are NHSC clinicians retained beyond their service obligations within their service sites and in service to the medically underserved more generally?
    a. How does retention for NHSC clinicians serving in 2005 compare to those serving in 1998?
    b. How does retention compare for participants of the NHSC Scholarship and Loan Repayment Programs?
    c. How does retention compare for clinicians serving within urban, rural and frontier communities?
    d. How does retention differ for clinicians of different disciplines?

2. What factors influence retention beyond the NHSC contract term within the service site and in service to the medically underserved more generally? Specifically, how is retention related to:

        i. whether well-suited site opportunities were available that met the clinician's needs?
        ii. the fit between clinicians and the sites they choose?
        iii. aspects of clinicians' work?
        iv. whether family's social, employment and educational needs are met in the community?

    a. How do these factors differ now from those for alumni of the 1980s and early 1990s

reported in the 2000 study report?

b. How do these factors differ in explaining retention beyond two years versus explaining retention beyond ten years?
c. What factors account for the retention differences of NHSC Scholars and Loan Repayors?

3. How important to retention is the sense of being supported by the NHSC? What role does customer service play in NHSC program structure/organization in retention?

This study was to address retention at ranges of time: short term (1 month to 1 year), mid-term (2 to 5 years), and long-term (7 to 12 years).

Past Evaluation of Retention within the NHSC

In the early years of the NHSC (1970s and early1980s), efforts were focused on recruiting and deploying practitioners in underserved communities thus fulfilling the mission of "providing health personnel and services to persons living in communities or areas of the US where health personnel and services are inadequate to meet the health needs of the residents of such communities and areas." This was done by making awards to students through the scholarship program and placing them in priority service sites some years later when their training was completed. Its successes were measured in terms of the volume of clinical personnel (generally physicians) it had placed (Pollitzer et al. 2000). Retaining clinicians beyond their two to four year service terms received less attention programmatically and less reporting; reported estimates of proportions retained were based on retention for only short periods beyond the end of clinicians' service terms (e.g., one month or shorter). Through the 1980s retention for NHSC clinicians in their service sites was reported to be from 50-80 percent at that one month period (Pollitzer et al. 2000). Cullen et al. (1997) found that 20 percent of the physicians who graduated medical school from 1975 to 1980 and served in the NHSC in rural areas were still located in their initial service county in 1991 and an additional 20 percent were then in some other rural location. They also assessed a longer term overall impact of the NHSC during this period by noting that nearly 20 percent of all students graduating from medical schools between 1975 and 1983 who were currently practicing in rural counties with small urbanized populations were initially NHSC assignees. They concluded that "Substantial medical care service was provided to rural underserved communities through obligated and post-obligation service."

External published reports in the late 1980s and early 1990s suggested that beyond one month, retention for NHSC clinicians was not strong (Pathman et al. 1992). Assessment of retention for physicians completing the Scholarship Program service terms in rural communities demonstrated a disappointing 14% retention at one year beyond their obligation and 11% at two years (Pathman et al. 1994). Singer, et al. reported in 1998 on a cross-sectional cohort of physicians working in community health centers at any time during the period 1990-1992. The percentage of primary care physicians in these community health centers who were serving in the NHSC that remained in their centers five years

later was only 17% compared to 36% retention for primary care physicians who began working in these centers outside the NHSC

Through the past 15 years the NHSC has given greater programmatic attention to retaining clinicians beyond their service terms. Retention in the NHSC's then new Loan Repayment Program, which began in 1987, was found to be better than in the NHSC Scholarship Program (Cullen et al., 1997; Pollitzer, 2000; Konrad, et al., 2000), and retention rates in loan repayment programs operated by states were also found to be better than in their scholarship programs (Pathman, et al. 2000, Pathman et al., 2004). Recognizing and demonstrating the retention strengths of the loan repayment model helped shape the NHSC's 2003 reauthorization legislation. In this legislation, Congress not only expanded the number of disciplines eligible for the Loan Repayment Program, but also granted the NHSC the flexibility it needed to shift more of its award dollars into its Loan Repayment Program, as a more effective retention strategy. The NHSC also recognized that some of its clinicians who leave their service sites move on to work in other practices in underserved areas, and this was embraced as another important measure of retention for the NHSC and a meaningful way it contributed long term to the health workforce needs of underserved communities (Rosenblatt, et al., 1996; Cullen et al.,1997).

Since early 2009 in a period when the NHSC has more than doubled in size with expanded funding through the American Recovery and Reinvestment Act and the Affordable Care Act, the NHSC has redoubled its efforts to promote retention, pushing for its now expanded workforce to have a more lasting impact on underserved communities. The NHSC has built a new "customer service" orientation to enhance its relationships with its clinicians and sites and to make the NHSC experience more uniformly positive. It has re-established its regional offices, which now regularly visit and assist NHSC clinicians in their practices as they serve. It has provided funding to its Primary Care Organizations to support the retention capacities of NHSC service sites (https://programportal.hrsa.gov/extranet/landing.seam).

Documenting the NHSC's success, or not, in now retaining its clinicians beyond their service terms is important to demonstrating the effectiveness of the NHSC's retention activities and that it is achieving its mission through retention in addition to recruitment. The last large evaluation of the NHSC's retention was conducted through a 1998 survey of current NHSC clinicians and alumni (Konrad et al., 2000), prior to the reauthorization legislation in 2003. The final report from that evaluation noted that one month retention of NHSC Loan Repayment alumni from the 1980s and early 1990s was 57.2% within the service site and 79.2% within any underserved site. One month retention of Scholarship alumni was 20.7% at the service site and 61.9% within any underserved site. Overall retention for the NHSC at one month increased from 19.4% for alumni from 1985 through 1990 to 50.5% for alumni from 1991 through 1997, principally because of the growth of the Loan Repayment Program relative to the Scholarship Program. However, that report did not explicitly measure long term retention of clinicians using an inception cohort and survival curve type of analysis.

The time was considered opportune to conduct a study of medium to longer term retention of NHSC clinicians, and also to assess how retention for recent NHSC clinicians differs from that measured in earlier decades. Not only has the NHSC expanded greatly over the last decade, but program emphasis has changed from the Scholarship Program to the Loan Repayment Program. Further, the number and

range health professions participating in the NHSC Loan Repayment Program has expanded to include more disciplines, especially in the area of mental health. In addition, the number and diversity of the services sites has increased, while the relative proportion of urban sites has also increased. Finally, the NHSC has honored more requests for contract continuations (renewals) from its clinicians, the absolute dollar value of student debt has increased, and states' own loan repayment programs have increased in number and thus more clinicians will now be involved in both federal and state sponsored loan repayment programs over the course of their career. These considerations make the study of clinician retention more complex in its conceptualization and execution. Future studies of retention of NHSC clinicians would benefit from more clearly and consistently defined measurement of the *location* of sites that qualify as successful retention outcomes (e.g., same site, any underserved site, any rural site, any "safety net" employer, high reliance on Medicaid, etc.) as well as more focused attention on a consistent and meaningful measure of the appropriate *duration* of retention and not just a claim of "retained" and "not retained." More rigorous study designs, preferably using inception cohorts and survival curve methods, should also be employed and more attention devoted to appropriate benchmarking of "success " and the appropriateness of various comparison groups (e.g., health professionals recruited to comparable settings or communities without a service obligation or those working in similar settings with state or other kinds of service obligations). Finally, as NHSC programs become less focused on physicians, it becomes relatively more important to understand and examine the job and geographic mobility behavior of these other health professions in the short, medium and long term time frames, both within the NHSC's programs, comparable programs sponsored by states, as well as within the health care workforce more generally.

SURVEY OVERVIEW

Study Groups

As specified in the study's Task Order, this study gathered and analyzed survey data from several groups of NHSC clinicians and administrators. These groups are as follows:

1. **Current Clinicians.** These clinicians were serving in the NHSC as of September 1, 2010 and most were still serving when they completed their surveys in the late summer and fall of 2011. These clinicians can report on the experiences of clinicians currently serving in the NHSC and can report on how long they anticipate remaining in their NHSC sites and within practices that focus on care for the underserved. Because most were still serving when surveyed, this group could not provide information on actual retention, which for them will not be known for several more years.
2. **2005 Recent Alumni.** These clinicians were serving in the NHSC as of September 1, 2005, augmented with a small number of clinicians the NHSC's smaller disciplines serving as of September 1, 2006. These clinicians can report on the experiences of NHSC clinicians in the recent past who are far enough along in their careers that nearly all will have completed their NHSC service, including any continuation (renewal) contracts, and can provide information on the actual retention of clinicians who have just recently completed NHSC service.
3. **1998 Remote Alumni.** These are clinicians who were serving in the NHSC as of December 31, 1997 who responded to the last large survey of retention within the NHSC, conducted in 1998. There were 1,412 clinicians serving at the end of December, 1997, of whom 1,143 were surveyed and 855 responded in 1998. We relocated and resurveyed most of these earlier respondents in the current study in 2011. In the earlier, 1998 survey these clinicians reported on their backgrounds and experiences in the NHSC. In the 2011 survey, they were asked only when they finished their NHSC service, when they left their last NHSC site and where they had worked since. From this group we can learn about the long term (10 to 12 years) retention of NHSC clinicians, and also compare their short term retention to that of the more recent, 2005 Alumni.
4. **Current Site Administrators.** This group is a sample of administrators and personnel directors of sites where NHSC clinicians were serving on September 1, 2010. These administrators, or sometimes personnel directors, were asked in the questionnaire about their clinics' experiences as well as their personal perspectives on the retention of clinicians serving in the NHSC.

All clinicians serving in the NHSC at the selected time points were eligible to be surveyed, including participants of both the NHSC Scholarship and Loan Repayment Programs, all disciplines, all types of service sites (Federally Qualified Health Centers, prisons, Indian Health Service Sites, etc.), whether it was clinicians' first, second or even sixth year serving in the NHSC, and whether clinicians were serving their first or a renewal NHSC contract.

Descriptions of the clinicians serving in the NHSC Scholarship and Loan Repayment Programs in 1998, 2005 and 2010, this study's target survey populations, are described in **Table 1**.

Table 1: Specialties and locations of NHSC clinicians serving in 1998, 2005 and 2010

	1998 (Dec. 31, 1997)		2005 (Sept. 1st)		2010 (Sept. 1st)	
	Scholar	Loan Repay	Scholar	Loan Repay	Scholar	Loan Repay
Total Workforce Size	432	980	435	2,816	538	5,996
Primary Care	411	812	402	1,696	456	3,445
	(95.1%)	(82.9%)	(92.4%)	(60.2%)	(84.8%)	(57.5%)
Dental Health	21	167	33	374	82	798
	(4.9%)	(17.0%)	(7.6%)	(13.3%)	(15.2%)	(13.3%)
Mental Health	--	--	--	716	--	1,753
	--	--	--	(25.4%)	--	(29.2%)
Other	--	--	--	30	--	--
	--	--	--	(1.1%)	--	--
Physician	223	540	182	1,000	390	1,387
Physician Asst.	115	126	105	347	27	889
Nurse Practitioner	64	120	76	290	36	1,006
Nurse Midwife	9	26	39	59	3	163
Dentist	21	167	33	339	82	669
Dental Hygienist	--	--	--	35	--	129
Clinical Psychologist	--	--	--	330	--	652
Social Worker	--	--	--	209	--	511
Licen Prof Counselor	--	--	--	143	--	500
Mar & Fam Therapy	--	--	--	24	--	76
Psych Nurse Spec	--	--	--	10	--	14
Pharmacist	--	--	--	23	--	--
Chiropractor	--	--	--	7	--	--
Urban	179	410	138	1,730	363	3,670
	(41.4%)	(41.8%)	(31.7%)	(61.4%)	(67.5%)	(64.3%)
Rural	253	570	280	936	147	1,787
	(58.6%)	(58.2%)	(64.4%)	(33.2%)	(27.3%)	(31.1%)
Frontier			17	150	28	264
			(3.9%)	(5.3%)	(5.2%)	(4.6%)

Counts for 2005 and 2010 reflect the NHSC active workforce as of September 1st of those years.

For 2005 and 2010 cohorts, specialties are based on data are from BMISS files obtained in fall 2010; classifications of urban/rural/frontier are based on 2006 National Center for Health Statistics Urban Rural Code classifications of site addresses listed in the BMISS files.

For 1998 cohort, specialties and urban/rural designation counts are estimates based on calculations reweighting up from information on respondents to the 1998 survey. Urban/rural classifications for this cohort are from the NHSC's Legacy Files, obtained in 1998.

Identifying Eligible Clinicians and Constructing Study Samples

Names, disciplines, NHSC contract information (Loan Repayment vs. Scholarship Program, contract dates), information on their service sites (type of site, rural vs. urban indicator) and email addresses were obtained from the BCRS Management Information System Solution (BMISS), which is the NHSC's administrative file of its current and past clinicians and sites. The BMISS files also provided information to identify the designated contact individual at all sites where NHSC clinicians were serving as of September 1, 2010, along with their email addresses.

For survey efficiency, a stratified random sampling strategy was used for some subgroups within the 2005 and 2010 clinician groups, to allow the study to not survey every NHSC clinician who served at the targeted time points yet ensure that the sample of clinicians who were surveyed were representative of all clinicians serving in the NHSC at the targeted times in important ways (see **Appendix IV** for details of the sampling strategy and its calculations). The features of clinicians and where they served that formed the strata into which all clinicians were sorted for sampling, were: (a) clinicians' disciplines, (b) service in the Loan Repayment vs. Scholarship Program, and (c) the urban vs. rural vs. frontier location of their clinics. Because of the numbers within the various subgroups, sampling was used with 2005 and 2010 Loan Repayors of certain disciplines and specialties within rural and/or urban areas. Because of their smaller numbers, all clinicians were surveyed who served in the Scholarship Program in 2005 and 2010, and also all Loan Repayors serving within frontier counties in 2005 and 2010.

We surveyed all clinicians who had responded to the earlier, 1998 survey. There was no sampling of this group.

Survey Mailings

As is described in **Appendix V**, six instruments were prepared and distributed to the study cohorts. The instruments for the recent and current clinicians were quite similar, and a representative instrument is presented in **Appendix VI**. Also presented in that appendix is a copy of the questionnaire sent to remote clinicians. Instruments were sent to the current, recent and site administrators via e-mail, with the instruments provided as 'hot links' within the e-mail. Instruments were sent to the remote clinicians via USPS – a copy of the transmittal letter sent to the remote clinicians is also presented in **Appendix VI**. The survey procedures are described in detail in **Appendix V** including follow up of non-respondents and undeliverable instruments.

Response Rates

Response rate details and calculations are included in **Appendix V**. Overall response rates for each study group were:

- Current Loan Repayors—54.7%
- Current Scholars—51.2%
- 2005 Recent Alumni Loan Repayors—22.6%
- 2005 Recent Alumni Scholars—30.0%
- 1998 Remote Alumni (Scholars and Loan Repayors)—50.1%

Outcome Variables--Retention

This study's outcome variables were the calculated percentages of NHSC clinicians that were still working in their NHSC service sites and within the broader set of practices that focus on care for the underserved at specific points in time after they had completed their NHSC service terms. Many NHSC clinicians apply for and are awarded continuation (renewal) Loan Repayment contracts after completing their original Scholarship or Loan Repayment contracts. Retention for these clinicians was calculated from the end date of their last continuation contract.

Retention was specified with respect to two settings:

(1) *remaining within the last NHSC service site.* This was calculated as the number of months from the date alumni report they completed their last NHSC service contract until the date they report they left the site they were last working when the completed their last NHSC service contract.

(2) *working in practices that were focused on care for the underserved.* Alumni identified as working in practices that focused on care for the underserved at a given point in time were (a) those who checked a box on the questionnaire to indicate that the job where they worked at that point in time "focused on the care for underserved" or (b) were still working in the last NHSC service site at that time (all NHSC sites were assumed to focus on care for the underserved). All clinicians who, at a given point in time, were not working in a practice they indicated focused on care for the underserved and who were not still working in their last NHSC service site were deemed to not be working in an underserved-focused practice at that time. Also included within those classified as not working within an underserved-focused practice where those who working in non-clinical positions, those in training positions and those not working at that time.

Retention rates are reported at specific points in time, e.g., at 2 years and at 10 years. From a broader perspective, retention at these various time points are taken to reflect retention in the short-term (1 month to 1 year), mid-term (2 to 5 years), and long-term (7 to 12 years).

Analytic Approaches

Study questions addressing comparisons of the retention of important groups—Loan Repayors versus Scholars, 1998 alumni versus 2005 alumni, those serving in urban versus rural versus frontier areas, and the those in the various participating disciplines—were answered with comparisons of group proportions retained at specified points in time (both within last service sites and in practices focused on care for the underserved), with chi-square tests to assess for statistically significant differences in group proportions.

Study questions about the factors that influence retention were addressed with multivariate logistic regression models, which identify the factors that remain statistically associated with retention while accounting for other factors being simultaneously tested. Outcome variables for the two sets of models were, respectively: (1) retention at two years within the last NHSC service site, and (2) retention at two years in a practice that clinicians report focused on care for the underserved. A series of smaller models were initially run to sequentially address features of NHSC contracts, clinician motivation in joining the NHSC, clinician demographics and discipline, the fit between the site and the clinician, characteristics of the clinician's job, and the clinician's satisfaction with various aspects of their job and practice. The purpose for first running these smaller models of related variables was to answer questions about relationships with retention for similar types of characteristics without "explaining away" and then not recognizing important relationships. For example, it is important to first test for the relationship between retention and Loan Repayment vs. Scholarship Program participation—which answers the question "Does the retention of Loan Repayors and Scholars differ?"—before then adding other variables like indicators of the clinician-site match and work satisfaction, which may account for the retention difference for Loan Repayors and Scholars. The latter analyses would answer questions like "What variables explain the retention differences between Loan Repayors and Scholars?" and "Once other factors are controlled for, does the retention difference between Loan Repayors and Scholars disappear?" Variables statistically related ($p<.10$) to retention within each smaller group of related variables were then tested together in a final test of variables related to retention that accounted for all other variables.

Study questions about the importance of the family's experiences in the service community—spouses' employment opportunities, spouses' overall satisfaction in the community, children's schooling opportunities, children's overall satisfaction—were not included within the multivariate models above, because this would have caused all clinicians without spouses and children to be dropped from the models. Instead, assessing the relationships between families' experiences and retention was carried out by first dichotomizing clinicians' ratings of how satisfied their families were and how well their needs were met in the community ("strongly agree" and "agree" versus "neutral", "disagree" and "strongly disagree") and comparing the proportions retained in the dichotomized groups, applying chi-square tests for significant group differences.

Study questions about the importance of the NHSC experience and the NHSC's operations to retention were similarly addressed by dichotomizing Likert-scaled ratings of (1) clinicians' satisfaction with "the contacts and other support you received from NHSC staff," (2) agreement with the statement,

"I felt appreciated by NHSC staff for my work," (3) satisfaction rating on the statement "Considering all of the experiences you have had with the NHSC Scholarship/Loan Repayment Program, how satisfied are you with this program?", and (4) rating on the question "To what extent did the NHSC Scholarship/Loan Repayment Program fall short of or exceed your expectations?" Proportions with the dichotomized ratings (high versus low) that were retained (in last service site and in a practice that focused on the care of the underserved) were reported and compared with chi-square tests.

All figures and analyses presented throughout this paper are weighted for sampling and response rate probabilities (apart from the presentation of the sampling and response rates themselves). Calculations to derive statistical weights are shown in **Tables 20**, **21** and **22** within the Appendices. "Down weights" are used in all calculations, which are statistically conservative and do not artificially inflate sample sizes to target population sizes.

A somewhat liberal *p*-value of .10 was used throughout these analyses as the level of statistical significance in this study where identifying (and not overlooking) important factors affecting retention is more important than wrongly identifying one or two additional factors as being related to retention due to an association that happened by chance alone.

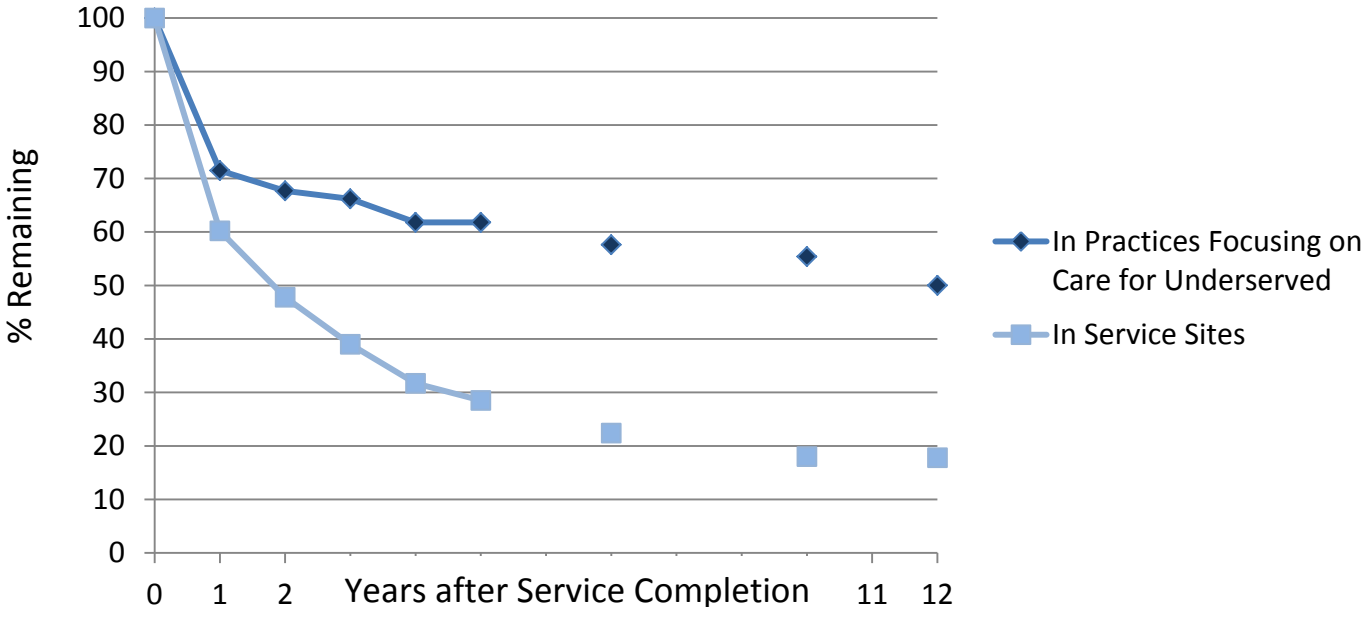
FINDINGS

FIRST STUDY QUESTIONS—PERCENTAGES RETAINED OVER TIME

How long are NHSC clinicians retained beyond their service obligations within their service sites and in service to the medically underserved?

Retention of 1998 Remote Alumni. Two years beyond their service terms, just under one-half of 1998 alumni (47.8%) continued working in their NHSC service sites and just over two thirds (67.7%) continued to work in practices that focused on care for the underserved more broadly, which included both their last NHSC service sites and other practices reported to focus on the underserved (**Figure 1**). At five years, more than one-quarter (28.5%) were still working in their service sites and 61.8% still worked in practices that focused on care for the underserved. Twelve years after completing their NHSC service, 17.8% remained in the sites they served in and half—50%—were working in practices that focused on care for the underserved.

Figure 1: Retention for 1998 Remote Alumni in Their NHSC Service Sites and within Practices Focused on Care for the Underserved

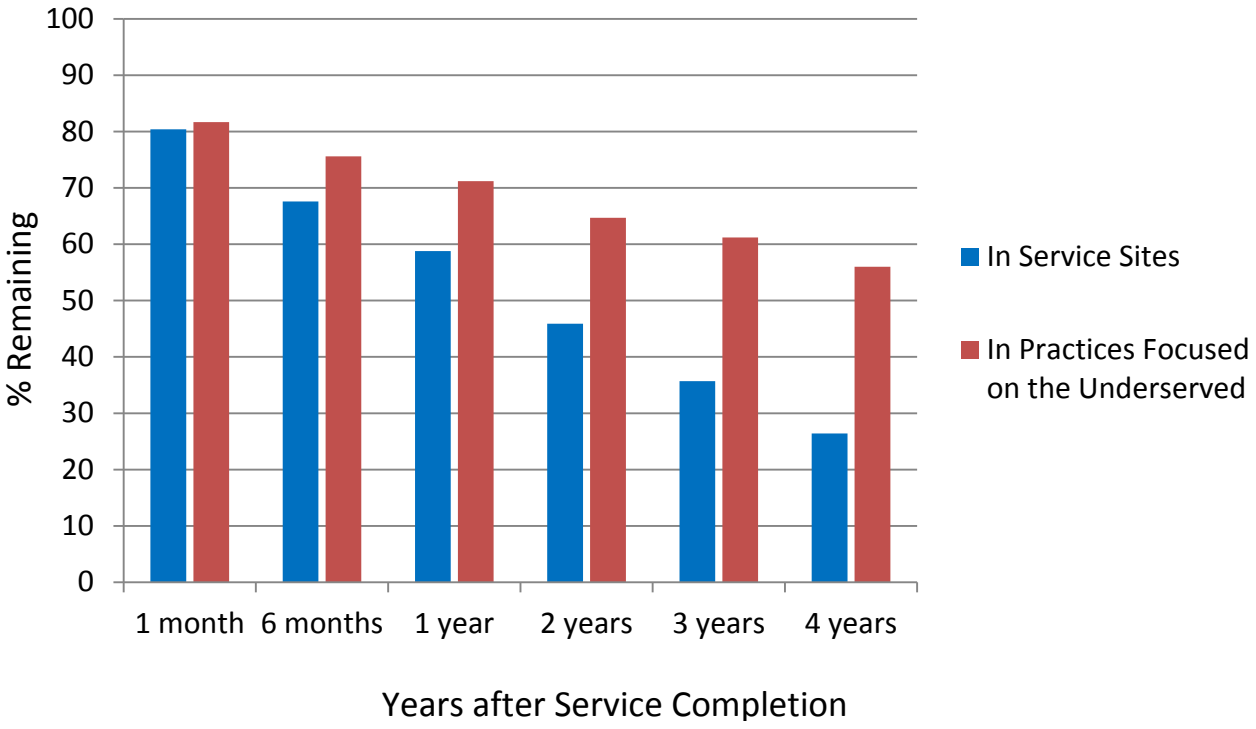


Data for Figure 1 Retention for 1998 Remote Alumni in Their NHSC Service Sites and within Practices Focused on Care for the Underserved

	1 mo	6 mos	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	7 yrs	10 yrs	12 yrs
In service sites	71.0%	63.5%	60.2%	47.8%	39.0%	31.7%	28.5%	22.4%	18.0%	17.8%
In underserved-focused practices	72.3%	71.5%	71.5%	67.7%	66.2%	61.8%	61.8%	57.6%	55.4%	50.0%

Retention of 2005 Recent Alumni. Among NHSC clinicians serving in 2005, 58.5% still worked in the practices where they had served 1 year after their NHSC contracts ended, 45.9% still worked there at 2 years and 26.4% at 4 years (**Figure 2**). Many of the clinicians serving in 2005 who left their service sites relocated to other practices that they report focused on the care for the underserved. Of those serving in 2005, 1 year after completing their NHSC terms 71.2% were working in practices that focused on care for the underserved, whether it was their NHSC site or another underserved-focused setting; 64.7% were still working in practices focused on care for the underserved at 2 years, and 56.0%% at 4 years.

Figure 2: Retention for 2005 Recent Alumni in Their NHSC Service Sites and within Practices Focused on Care for the Underserved



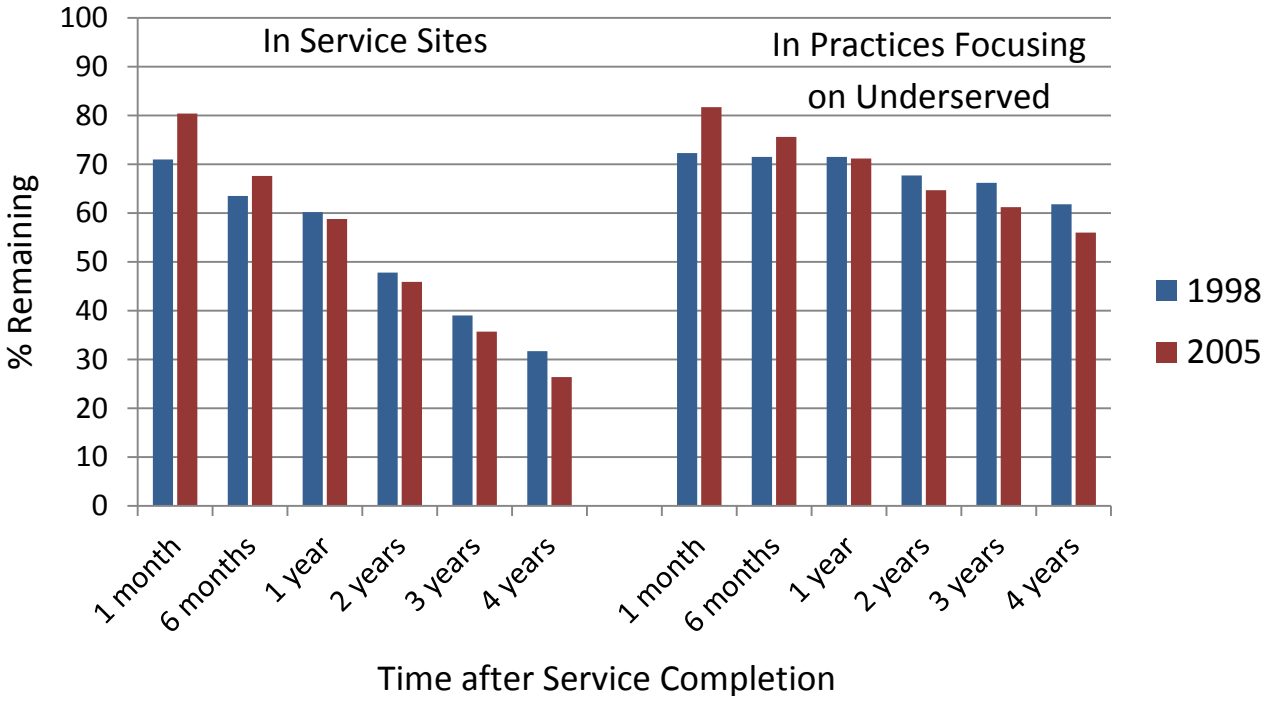
Data for Figure 2. Retention for 2005 Recent Alumni in Their NHSC Service Sites and within Practices Focused on Care for the Underserved

	1 mo	6 mos	1 yr	2 yrs	3 yrs	4 yrs
In service sites	80.4%	67.6%	58.8%	45.9%	35.7%	26.4%
In underserved-focused practices	81.7%	75.6%	71.2%	64.7%	61.2%	56.0%

Comparative Retention of Clinicians Serving in 1998 and 2005. A somewhat greater percentage of clinicians serving in 2005 (80.4%) remained working in their service sites 1 month beyond their service terms than clinicians who served in 1998 (71.0%) (**Figure 3**). Retention within service sites was more comparable for the 1998 and 2005 groups at 1 year (60.2% and 58.8%), 2 years (47.8% and 45.9%) and at 4 years (31.7% and 26.4%).

The percentage of 2005 alumni who remained working in practices that focused on care for the underserved at 1 month (80.4%) was also somewhat greater than the percentage of 1998 alumni who did so (71.0%) (**Figure 3**). In subsequent years, the percentages of 1998 and 2005 alumni retained within practices that focused on care for the underserved were comparable; specifically, at 1 year 71.5% and 71.2%, respectively, and at 4 years 61.8% and 56%.

Figure 3: Comparison of Retention for 1998 and 2005 Alumni in Their Service Sites and in Practices Focused on Care for the Underserved



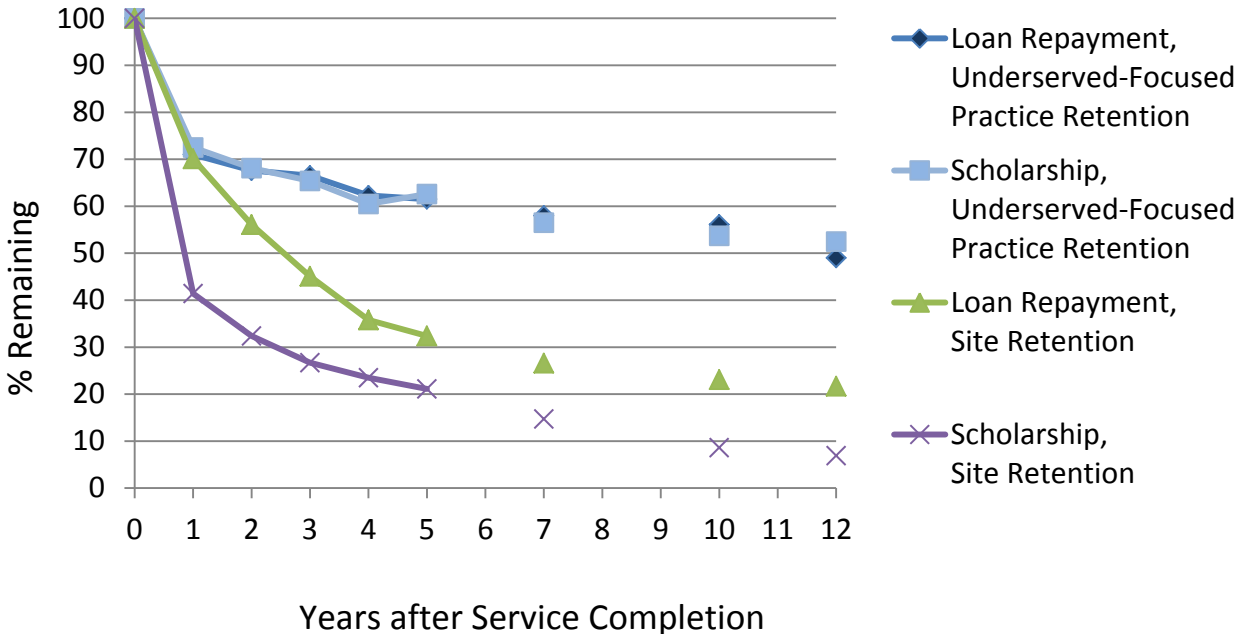
Data for Figure 3. Comparison of Retention for 1998 and 2005 Alumni in Their Service Sites beyond Their NHSC Service Periods

In service site		1 mo	6 mos	1 yr	2 yrs	3 yrs	4 yrs
	1998	71.0%	63.5%	60.2%	47.8%	39.0%	31.7%
	2005	80.4%	67.6%	58.8%	45.9%	35.7%	26.4%
In practices with underserved focus							
	1998	72.3%	71.5%	71.5%	67.7%	66.2%	61.8%
	2005	81.7%	75.6%	71.2%	64.7%	61.2%	56.0%

Comparative Retention of Scholars vs. Loan Repayors. Among the 1998 Remote Alumni, those serving in the Loan Repayment Program were more likely than those in the Scholarship Program to be retained within their service sites after their service terms were complete at each subsequent point in time (**Figure 4**). At 1 year 70.1% of Loan Repayment alumni versus 41.4% of Scholarship Alumni were still in their NHSC service sites, at 3 years it was 45.1% vs. 26.7%, at 5 years it was 32.4% vs. 21.1%, and at 12 years the difference was 21.7% vs. 6.9%.

Among 1998 Remote Alumni, comparable percentages of those who served in the Loan Repayment and Scholarship Programs remained working in practices that focus on care for the underserved each year after their NHSC service terms were complete (**Figure 4**). At 1 year the percentages of Loan Repayment and Scholarship alumni still working in underserved-focused practices was 71.0% vs. 72.5%, respectively, at 4 years it was 62.3% vs. 60.5%, and at 12 years retention was 49.0% vs. 52.5%.

Figure 4: Comparison of Retention for 1998 Scholarship and Loan Repayment Alumni within Their NHSC Service Sites and in Practices Focused on Care for the Underserved



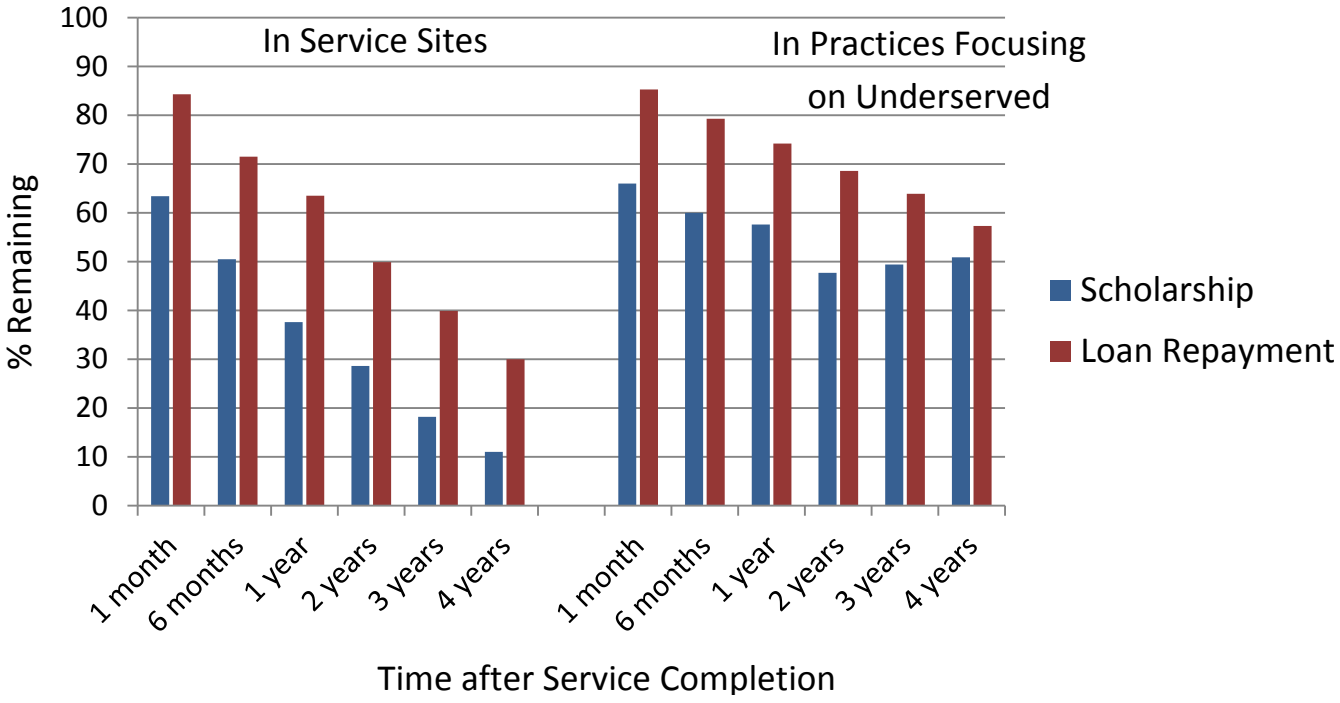
Data for Figure 4. Comparison of Retention for 1998 Scholarship and Loan Repayment Alumni within Their NHSC Service Sites and in Practices Focused on Care for the Underserved

	1 mo	6 mos	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	7 yrs	10 yrs	12 yrs
In service site										
Loan Repayment			70.1%	56.1%	45.1%	35.8%	32.4%	26.6%	23.1%	21.7%
Scholarship			41.4%	32.4%	26.7%	23.5%	21.1%	14.7%	8.6%	6.9%
In Practices with Underserved Focus										
Loan Repayment	72.7%	72.9%	71.0%	67.6%	66.5%	62.3%	61.5%	58.0%	56.1%	49.0%
Scholarship	71.2%	67.8%	72.5%	68.1%	65.4%	60.5%	62.6%	56.5%	53.7%	52.5%

Alumni of the Loan Repayment Program in 2005 also remained longer in their service sites than Alumni of the Scholarship Program from that period (**Figure 5**). Percentages retained in their service sites were 63.5% vs. 37.6% at 1 year, respectively, at 2 years it was 49.9% vs. 28.6% and at 4 years it was 30% vs. 11%.

Among 2005 Alumni, those who served in the Loan Repayment Program remained longer than Scholars working within practices that focused on the underserved (**Figure 5**). Retained percentages among Loan Repayment and Scholarship alumni at 1 year were 74.2% vs. 57.6%, respectively, at 2 years it was 68.6% vs. 47.7% and at 4 years it was 57.3% vs. 50.9%.

Figure 5: Comparison of Retention for 2005 Scholarship and Loan Repayment Alumni within Their NHSC Service Sites and in Practices Focused on Care for the Underserved

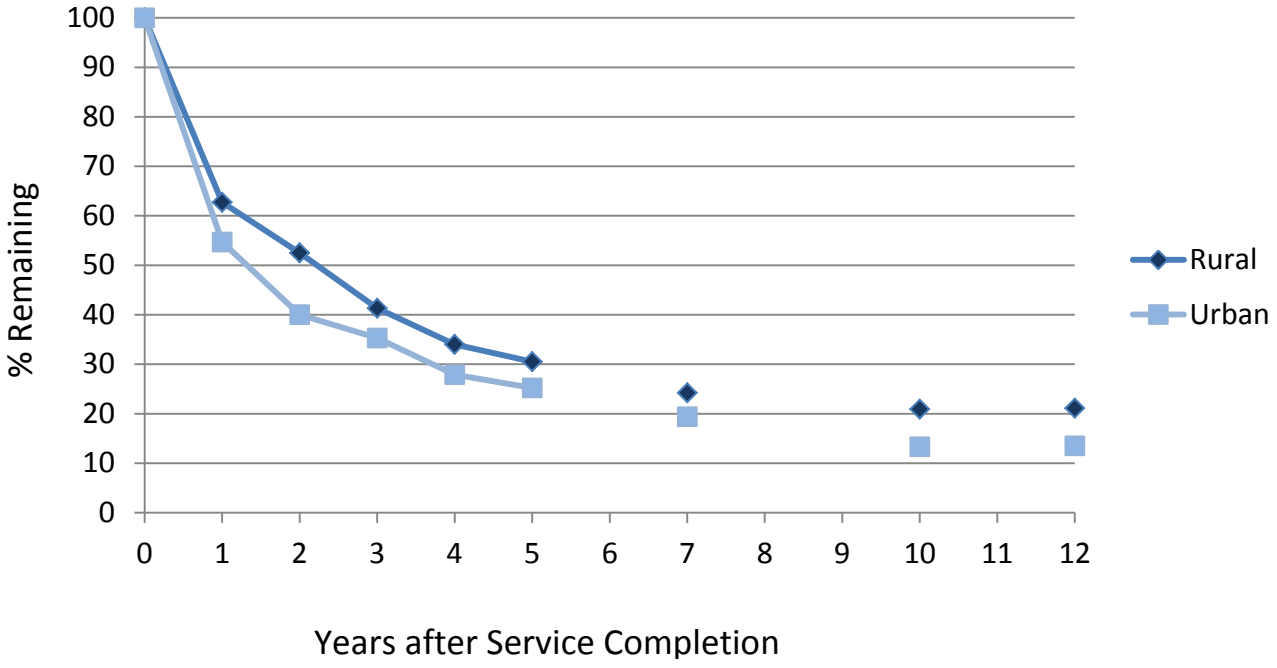


Data for Figure 5. Comparison of Retention for 2005 Scholarship and Loan Repayment Alumni within Their NHSC Service Sites and in Practices Focused on Care for the Underserved

	1 mo	6 mos	1 yr	2 yrs	3 yrs	4 yrs
In Service Site						
Scholarship	63.4%	50.5%	37.6%	28.6%	18.2%	11.0%
Loan Repayment	84.3%	71.5%	63.5%	49.9%	39.9%	30.0%
In Practices with Focus on Underserved						
Scholarship	66.0%	60.0%	57.6%	47.7%	49.4%	50.9%
Loan Repayment	85.3%	79.3%	74.2%	68.6%	63.9%	57.3%

Comparative Retention of Clinicians Serving in Urban, Rural and Frontier Communities. Retention within service sites for NHSC 1998 Remote Alumni who served within rural areas was modestly longer than that for those who served in urban areas (**Figure 6**). For the 1998 Alumni, retention within service sites at 1 year was 62.7% for those serving in rural areas vs. 54.7% for those in urban areas; at 5 years retention was 30.5% for those in rural and 25.2% for those in urban service sites, and at 10 years, retention for those serving in rural areas was 20.9% and for those serving in urban areas was 13.3%.

Figure 6: Comparison of Retention within NHSC Service Sites for 1998 Remote Alumni Who Served in Urban and Rural Counties

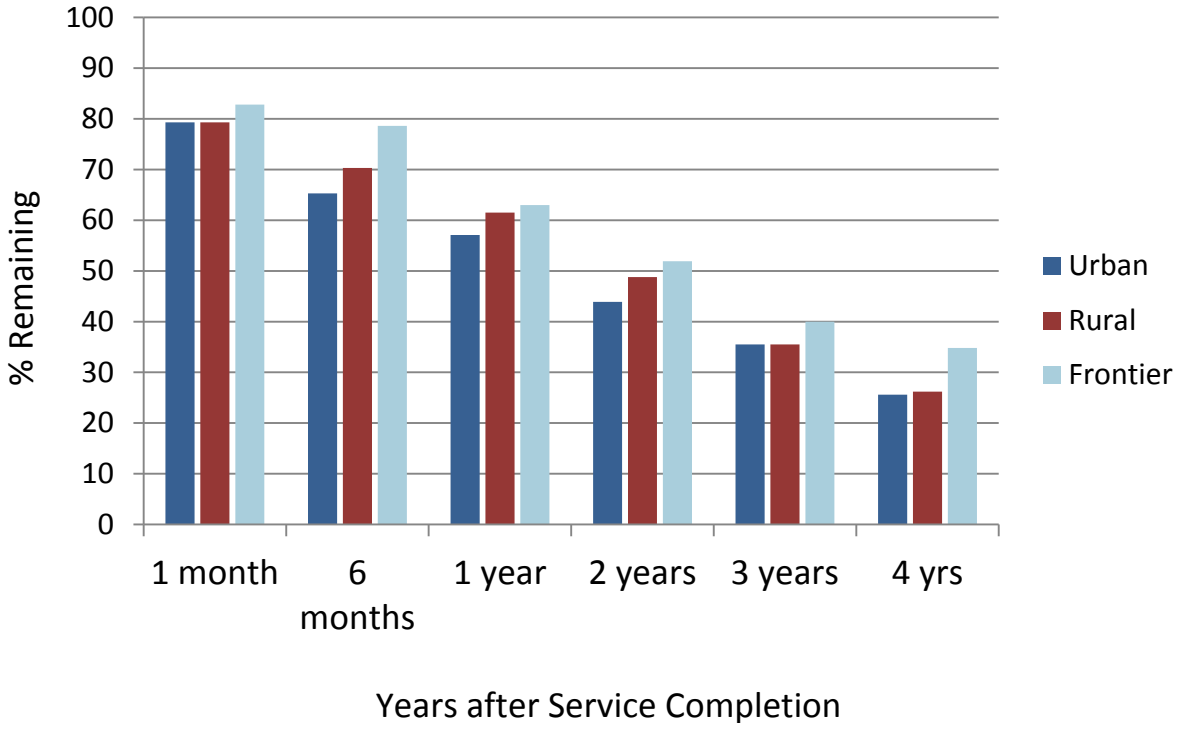


Data for Figure 6. Comparison of Retention within NHSC Sites for 1998 Remote Alumni Who Served in Urban and Rural Counties

	1 mo	6 mos	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	7 yrs	10 yrs	12 yrs
Urban	73.7%	62.1%	54.7%	40.0%	35.3%	27.9%	25.2%	19.4%	13.3%	13.3%
Rural	70.0%	64.6%	62.7%	52.5%	41.3%	34.0%	30.5%	24.2%	20.9%	20.9%
p-value	.17	.52	.014	<.001	.054	.045	.069	.084	.002	- -

Among 2005 Recent Alumni, retention within service sites was comparable for those who served in urban and rural counties at each time point from 1 month to 4 years; specifically 57.1% vs. 61.5% at 1 year, respectively, and 25.6% vs. 26.2% at 4 years. Site retention tended to be slightly higher for those who serviced within frontier counties, but the numbers in this group are small (29 clinicians total) so the retention differences from the urban and rural groups are likely not of real significance.

Figure 7: Comparison of Retention within NHSC Service Sites for 2005 Recent Alumni Who Served in Urban, Rural and Frontier Counties

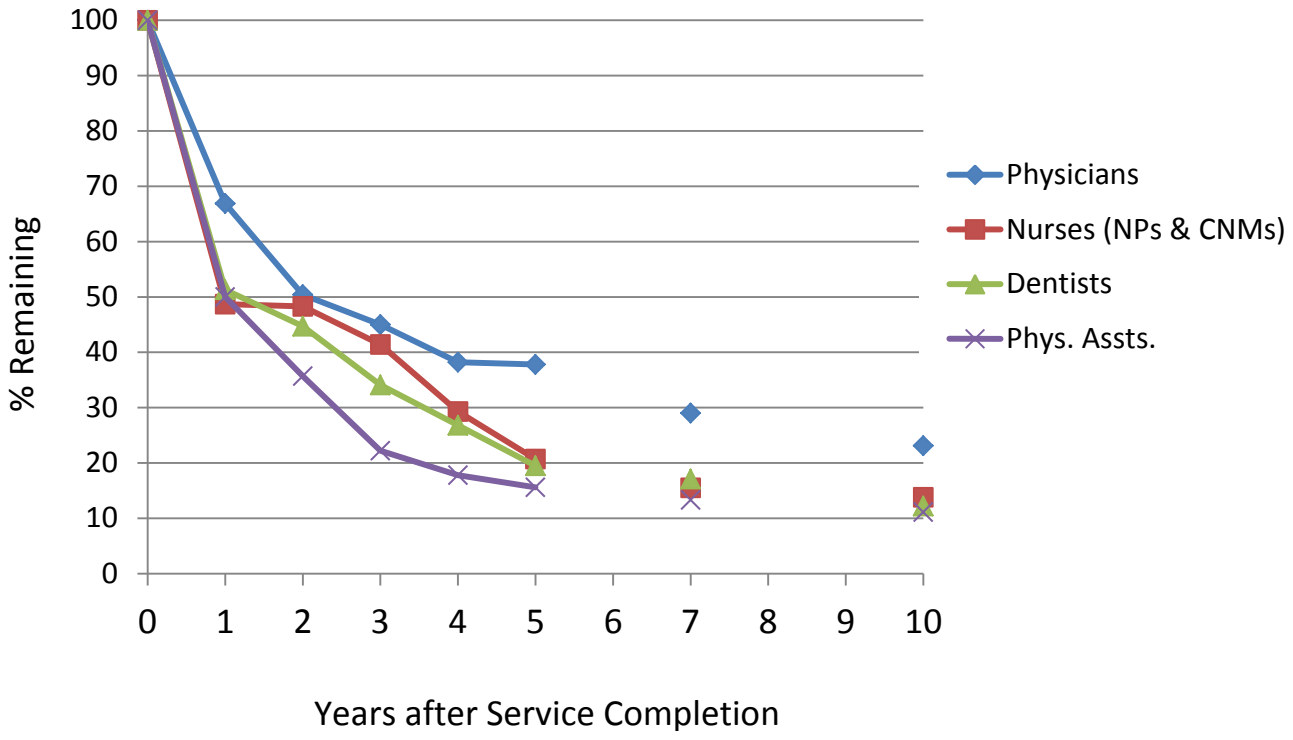


Data for Figure 7. Comparison of Retention within NHSC Service Sites for 2005 Recent Alumni Who Served in Urban, Rural and Frontier Counties

	1 mo	6 mos	1 yr	2 yrs	3 yrs	4 yrs
Urban	79.3%	65.3%	57.1%	43.9%	35.5%	25.6%
Rural	79.3%	70.3%	61.5%	48.8%	35.5%	26.2%
Frontier	82.8%	78.6%	63.0%	51.9%	40.0%	34.8%
p-value	.71	.24	.59	.49	.90	.63

Comparative Retention of Clinicians of the Various Disciplines. Retention within service sites for 1998 Remote Alumni varied for clinicians of the various disciplines (**Figure 8**). Up to five years after service terms were completed, retention rates were highest for physicians, lowest for physician assistants, and in between for nurse practitioners/nurse midwives and dentists. Beyond five years after service terms, the nursing, dental and physician assistant groups demonstrated retention comparable to one another, with retention rates for physicians higher.

Figure 8: Comparison of Retention within Service Sites for 1998 Remote Alumni, by Discipline

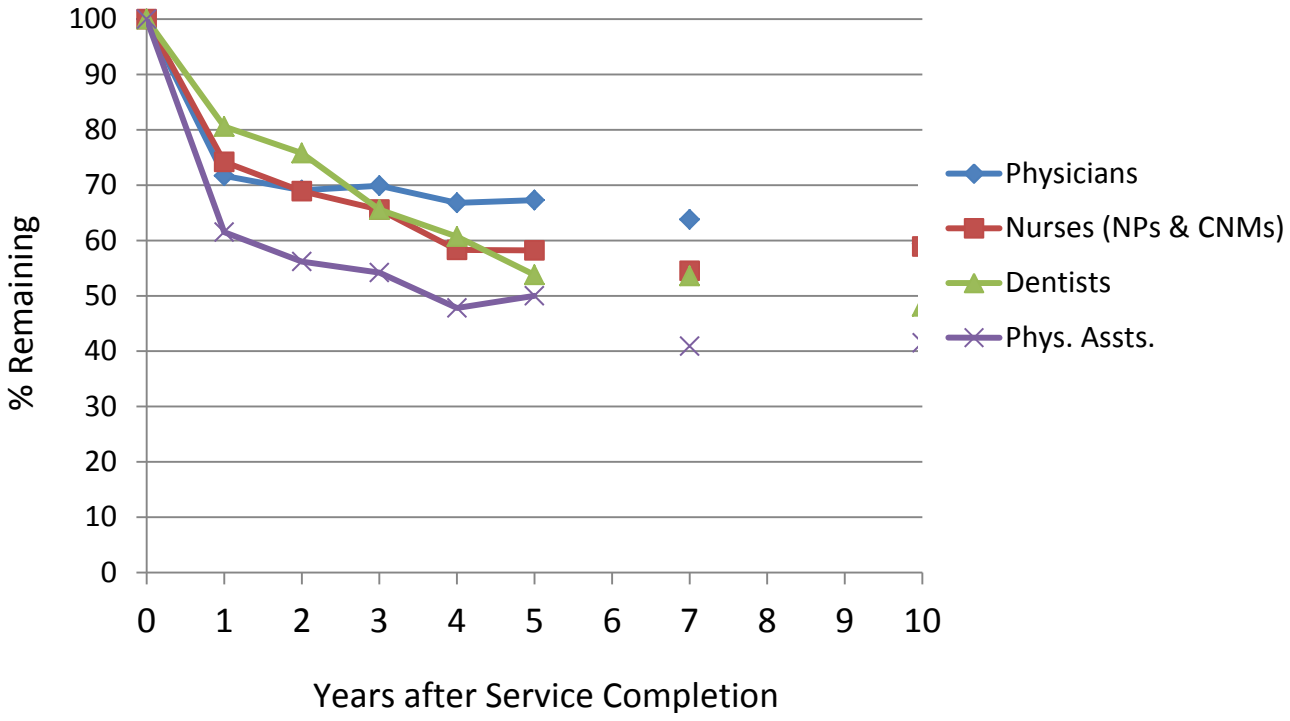


Data for Figure 8. Comparison of Retention within Service Sites for 1998 Remote Alumni, by Discipline

	1 mo	6 mos	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	7 yrs	10 yrs
Physicians	78.5	71.5	66.9	50.4	45.0	38.2	37.8	29.0	23.1
Nurses (NPs & CNMs)	63.4	56.1	48.7	48.3	41.4	29.3	20.7	15.5	13.8
Dentists	67.0	60.5	51.3	44.7	34.1	26.8	19.5	17.1	12.2
Physician Assistants	61.9	52.4	50.0	35.7	22.2	17.8	15.6	13.3	11.1
p-value	<.001	<.001	<.001	.005	<.001	<.001	<.001	<.001	<.001

For the 1998 Remote Alumni, retention within practices that focus on care for the underserved also varied by discipline but not quite as much (**Figure 9**). Retention percentages within underserved settings were lowest for physician assistants at all time periods, whereas at various points percentages were highest variably for physicians, nurses and dentists.

Figure 9: Comparison of Retention within Practices Focused on Care of the Underserved, for 1998 Remote Alumni, by Discipline

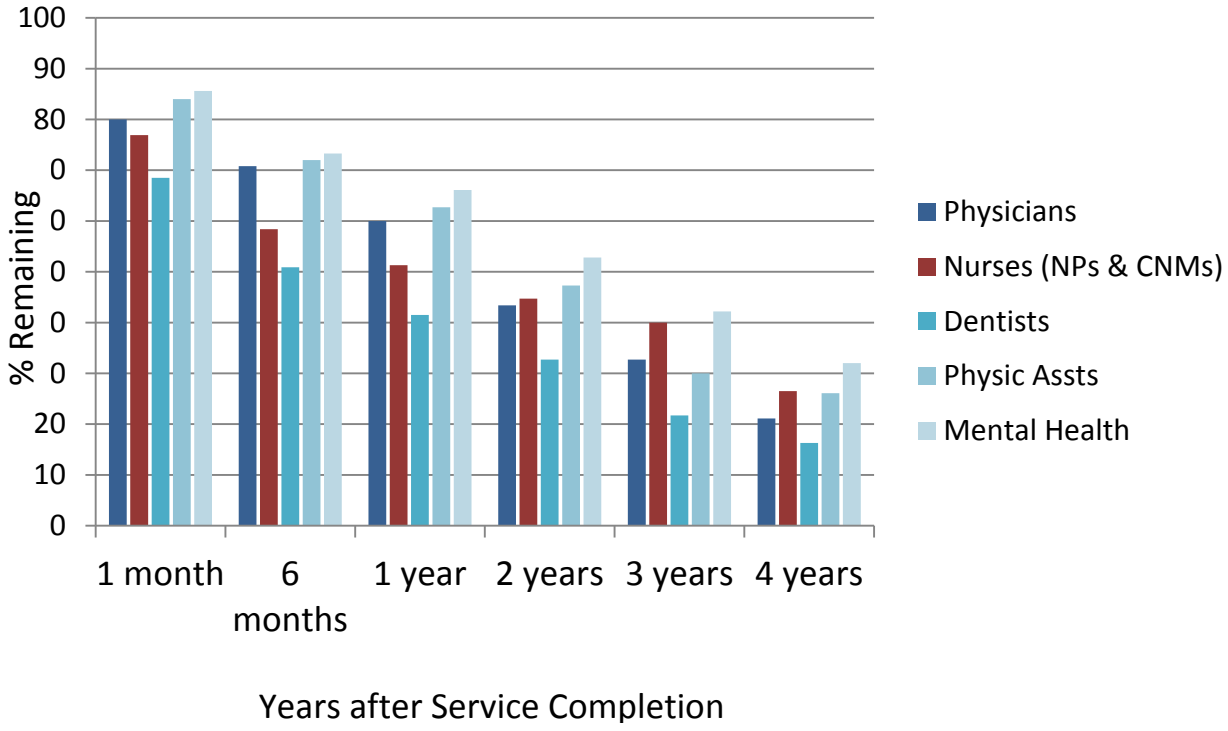


Data for Figure 9. Comparison of Retention within Practices Focused on Care of the Underserved, for 1998 Remote Alumni, by Discipline

	1 mo	6 mos	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	7 yrs	10 yrs
Physicians	70.6	70.9	71.7	69.1	69.9	66.8	67.3	63.8	59.4
Nurses (NPs & CNMs)	73.8	74.2	74.2	68.9	65.6	58.3	58.2	54.5	58.9
Dentists	85.0	82.1	80.6	75.8	65.6	60.7	53.8	53.6	48.1
Physician Assistants	66.7	62.7	61.5	56.2	54.2	47.8	50.0	40.9	41.5
p-value	.001	.001	.001	.002	.001	<.001	<.001	<.001	<.001

Retention within service sites for 2005 Recent Alumni also varied by discipline but in different directions (**Figure 10**). Retention tended to be highest for mental health clinicians (all types combined) at all time points and lowest for dentists.

Figure 10: Comparison of Retention within NHSC Service Sites for 2005 Recent Alumni of the Various Disciplines

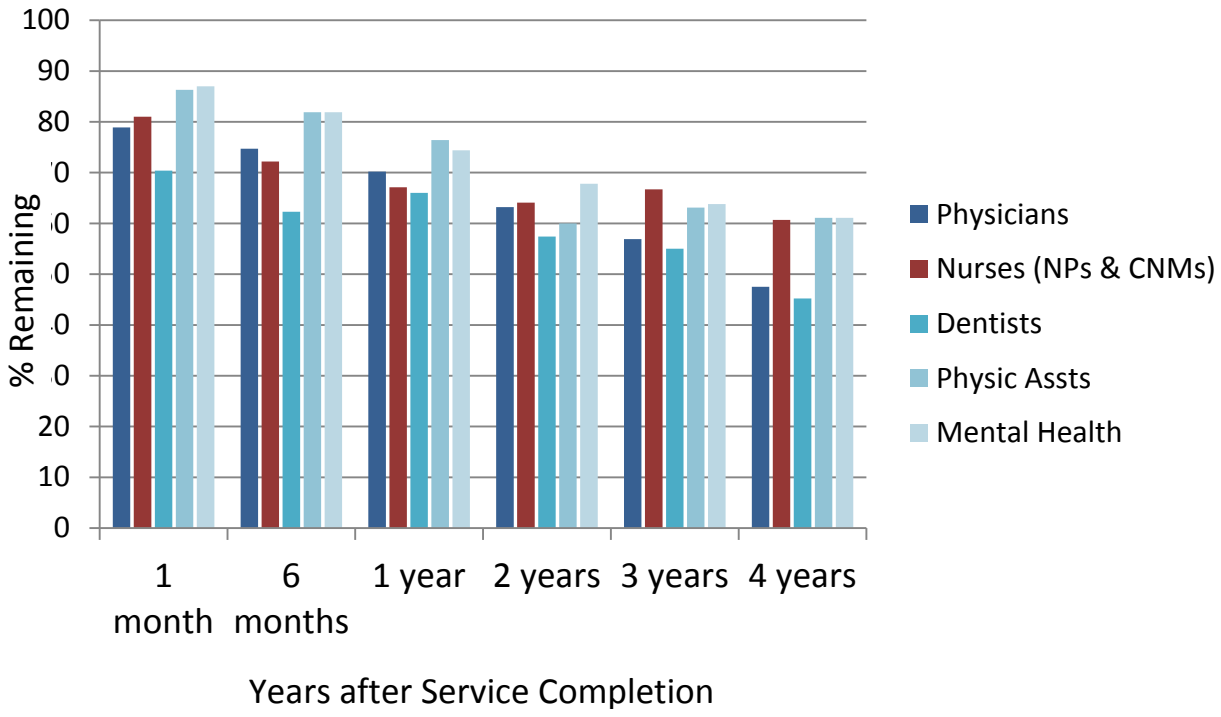


Data for Figure 10. Comparison of Retention within NHSC Service Sites for 2005 Recent Alumni of the Various Disciplines

	1 mo	6 mos	1 yr	2 yrs	3 yrs	4 yrs
Physicians	80.0%	70.8%	60.0%	43.4%	32.7%	21.1%
Nurses (NPs & CNMs)	76.9%	58.4%	51.3%	44.7%	40.0%	26.5%
Dentists	68.5%	50.9%	41.5%	32.7%	21.7%	16.3%
Physician Assistants	84.0%	72.0%	62.7%	47.3%	30.0%	26.1%
Mental Health	85.6%	73.3%	66.1%	52.8%	42.2%	32.0%
p-value	.127	.023	.032	.092	.036	.114

Retention within practices that focus on care for the underserved for 2005 Recent Alumni also tended to be lower at all time points for dentists (**Figure 11**). Among the other disciplines, the percentages working within practices that focus on the underserved tended to fluctuate relative to other disciplines, although percentages tended to be highest at most time points for physician assistants and mental health clinicians. Nurse clinicians also demonstrate high retention across the time points.

Figure 11: Comparison of Retention within Practices That Focus on Care for the underserved for 2005 Recent Alumni of the Various Disciplines



Data for Figure 11. Comparison of Retention within Practices that Focus on Care for the Underserved for 2005 Recent Alumni of the Various Disciplines

	1 mo	6 mos	1 yr	2 yrs	3 yrs	4 yrs
Physicians	78.9%	74.7%	70.2%	63.2%	56.9%	47.5%
Nurses (NPs & CNMs)	81.0%	72.2%	67.1%	64.1%	66.7%	60.7%
Dentists	70.4%	62.3%	66.0%	57.4%	55.0%	45.2%
Physician Assistants	86.3%	81.9%	76.4%	60.0%	63.1%	61.1%
Mental Health	87.0%	81.9%	74.4%	67.8%	63.8%	61.1%
p-value	.061	.051	.50	.54	.57	.156

SECOND STUDY QUESTIONS – FACTORS AFFECTING RETENTION

What factors influence retention beyond the service obligation within the service site and in service to the medically underserved?

Factors associated with retention within service sites 2 years beyond service terms for 1998 Remote Alumni.

A total of 47.8% of 1998 Remote Alumni were still working in their service sites 2 years after completing their last NHSC contract. Subgroups of variables correlated with site retention at 2 years are shown sequentially for features of the NHSC contract, the clinician's motivation in joining the NHSC, clinician demographics and discipline, the fit between the clinician and the site, the clinician's job, and the clinician's satisfaction with various aspects of their job and practice (**Table 2**). (The variables that could be tested were limited to the information collected in the 1998 survey.) The variables statistically related (p<.10) to retention within each group of variables were then tested together to identify a final set of variables related to retention that accounted for all other variables (**Table 2, far right columns**).

Among the 1998 Remote Alumni, the likelihood of being retained in their NHSC service sites 2 years after their service terms were fulfilled was greater for those in the Loan Repayment Program (odds ratio of remaining relative to Scholars, 2.05)[1] and those serving in sites that clinicians felt met most of their professional needs (O.R., 2.59), had a good reputation in the community (O.R. 2.24) and where they were busy seeing over 100 patients per week (O.R. 2.02). Characteristics of clinicians themselves (sex, age, discipline; reported importance of providing care to the underserved) and service communities (rural/urban) were not statistically associated with site retention at 2 years after adjusting for these other factors.

[1] An odds ratio (O.R.) is the odds of one group remaining in the NHSC service site at a given point in time compared to the odds of a second group, e.g., the odds ratio of 2.05 for retention of Loan Repayment Program alumni relative to Scholarship Program alumni at 2 years means that the relative odds of remaining at the 2 year point is twice that for alumni of the Loan Repayment Program compared to alumni of the Scholarship Program. An odds ratio of 1.0 means the groups have the same odds of remaining; an odds ratio of less than 1.0 means that the second group has greater odds of remaining than the first.

Table 2: Retention of 1998 Remote Alumni within their NHSC service sites 2 years after service terms were completed Full and sequential partial logistic regression models of features of the NHSC contract, clinicians, the community and its fit with the clinician, features of clinicians' work and their satisfaction with their job

	NHSC contract		**Motivations when joining NHSC**		**Clinician features**		**Community and site fit**		**Work features**		**Full Model**		
	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Odds Ratio
Loan Repayment	**.988**	**.001**	--	--	--	--	--	--	--	--	**.716**	**.023**	**2.05**
3 yr. obligation (vs. 2 year)	-.026	.94	--	--	--	--	--	--	--	--	--	--	--
4 yr. obligation (vs. 2 year)	-.601	.55	--	--	--	--	--	--	--	--	--	--	--
"Strongly agree" that when considering the NHSC they wanted "a chance to provide health care in an underserved area"	--	--	-.105	.68	--	--	--	--	--	--	--	--	--
Male (vs. female)	--	--	--	--	-257	.36	--	--	--	--	--	--	--
≤30 y.o. @ start of service (vs. 31-39 years of age)	--	--	--	--	-.125	.68	--	--	--	--	--	--	--
≥40 y.o. @ start of service (vs. 31-39 years of age)	--	--	--	--	.016	.96	--	--	--	--	--	--	--

Dentist (vs. physician)	--	--	--	--	-.233	.79	--	--	--	--	--	--	--
Nurse practitioner/midwife (vs. physician)	--	--	--	--	-.260	.77	--	--	--	--	--	--	--
Physician assistant (vs. physician)	--	--	--	--	-.659	.52	--	--	--	--	--	--	--
Rural site (vs. urban)	--	--	--	--	--	--	**.506**	**.070**	--	--	.379	.21	1.46
Site in state where grew up and/or trained	--	--	--	--	--	--	**.553**	**.045**	--	--	.199	.51	1.22
Found site that met most professional needs	--	--	--	--	--	--	**1.381**	**.001**	--	--	**.952**	**.025**	**2.59**
Able to practice full scope	--	--	--	--	--	--	--	--	-.314	.47	--	--	--
≥100 patients/week (vs. 70-99 patients/week)	--	--	--	--	--	--	--	--	**.725**	**.027**	**.704**	**.019**	**2.02**
<70 patients/week (vs. 70-99 patients/week)	--	--	--	--	--	--	--	--	-.199	.56	--	--	--
Satisfaction w/ total compensation*	--	--	--	--	--	--	--	--	**.630**	**.026**	.413	.165	1.51
Satisfaction w/practice's reputation in the local community *	--	--	--	--	--	--	--	--	**.965**	**.001**	**.807**	**.009**	**2.24**
Model Chi-square	14.07	.003	.169	.681	4.60	.71	22.84	<.001	29.072	<.001	44.52	<.001	
Model R-square (Nagelkerke)	.074		.001		.025		.117		.150		.226		

* These two satisfaction variables were selected using forward stepwise logistic regression from among the 19 satisfaction variables in the Remote Alumni questionnaire as the two variables significantly associated with retention.

Table 3 below summarizes the variables found in the statistical models of **Table 2** to be statistically related or not related to the retention of the 1998 alumni in their service sites 2 years after their last NHSC service contracts are completed, adjusting for all other tested variables.

Table 3: Factors associated positively (+) and negatively (-) with working within service sites 2 years beyond NHSC service terms for 1998 Remote Alumni, after controlling for all other factors

Features	Related to Longer Retention	Not Related to Retention
NHSC contract	• (+) Loan repayment	• Length of contract
Clinician motivation	• none	• Clinician desire to provide care for underserved
Clinician	• none	• Gender • Age • Discipline
Community and site fit	• (+) Finding a site that met most professional needs	• Rural vs. urban • In a state where clinician was raised or trained
Work and job	• (+) Seeing 100 or more patients/week (vs. 70-99 patients)	• Able to practice full scope of training • Seeing <70 patients/week
	Satisfaction with: • (+) The reputation of the practice in the community	Satisfaction with 18 other factors, including: • Salary • Fringe benefits • Night and weekend call duties • Access to specialists • Availability of locum tenens • Continuing education benefits

Factors associated with retention within practices that focus on care for the underserved 2 years beyond service terms for 1998 Remote Alumni.

A total of 67.7% of 1998 Remote Alumni were working in sites that they reported focused on care for the underserved 2 years after completing their last NHSC contract. Subgroups of variables correlated with working in underserved-focused practices at 2 years are shown sequentially for features of the NHSC contract, the clinician's motivation in joining the NHSC, clinician demographics and discipline, the fit between the clinician and the site, the clinician's job, and the clinician's satisfaction with various aspects of their job and practice (**Table 4**). The variables statistically related (p<.10) to retention within each group of variables were then tested together to identify a final set of variables related to retention that accounted for all other variables (**Table 4, far right columns**)

Among these 1998 alumni, the likelihood of working in practices that focused on care for the underserved 2 years after NHSC service terms were completed was greater for clinicians who reported greater importance to providing care in an underserved area (O.R. 1.64) and were not physician assistants (O.R. 0.65). Likelihood of working in underserved-focused practices was also greater for those who had found a NHSC site they felt met most of their professional needs (O.R. 2.45) and where they were busy seeing more than 100 patients per week (O.R. 2.06) and were not in a practice seeing fewer than 70 patients per week. Also, those who had 3 year of initial service terms were more likely to be working in underserved-focused practices 2 years after their service terms than clinicians with 2 year obligations (O.R. 2.03). Again as seen for retention within service sites for these 1998 Remote Alumni, demographic variables (age, sex, marital status) and the rural versus urban location of where they served in the NHSC were not associated with 2 year retention within underserved-focused practices for these 1998 alumni.

Table 4: Retention of 1998 Remote Alumni within practices that focus on care for the underserved 2 years after service terms were completed Full and sequential partial logistic regression models of features of the NHSC contract, importance to clinician of providing care to underserved, clinician features, the community and its fit with the clinician, features of clinicians' work and their satisfaction with their job

	NHSC contract		**Motivations when joining NHSC**		**Clinician features**		**Community and site fit**		**Work features**				**Full Model**
	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Odds Ratio
Loan Repayment	.068	.82	--	--	--	--	--	--	--	--	-.224	.17	0.80
3 yr. obligation (vs. 2 year)	**.667**	**.098**	--	--	--	--	--	--	--	--	**.707**	**.002**	**2.03**
4 yr. obligation (vs. 2 year	-0.101	.83	--	--	--	--	--	--	--	--	.025	.92	0.92
"Strongly agree" that when considering the NHSC they wanted "a chance to provide health care in an underserved area"	--	--	**.513**	**.047**	--	--	--	--	--	--	**.494**	**.001**	**1.64**
Male (vs. female)	--	--	--	--	.121	.67	--	--	--	--	--	--	--
≤30 y.o. @ start of service (vs. 31-39 years of age)	--	--	--	--	.254	.44	--	--	--	--	--	--	--
≥40 y.o. @ start of service (vs. 31-39 years of age)	--	--	--	--	-.179	.58	--	--	--	--	--	--	--
Married (vs. not-married)	--	--	--	--	.420	.14	--	--	--	--	--	--	--

Dentist (vs. physician)	--	--	--	--	.230	.62	--	--	--	--	--	--	--
Nurse practitioner/midwife (vs. physician)	--	--	--	--	.109	.78	--	--	--	--	--	--	--
Physician assistant (vs. physician)	--	--	--	--	**-.598**	**.09**	--	--	--	--	**-.431**	**.019**	**0.65**
Rural site (vs. urban)	--	--	--	--	--	--	.275	.30	--	--	--	--	--
Site in state where grew up and/or trained	--	--	--	--	--	--	.166	.53	--	--	--	--	--
Found site that met most professional needs	--	--	--	--	--	--	**.960**	**.004**	--	--	**.897**	**<.001**	**2.45**
Able to practice full scope	--	--	--	--	--	--	--	--	-.107	.60	--	--	--
≥100 patients/week (vs. 70-99 patients/week)	--	--	--	--	--	--	--	--	**.739**	**<.001**	**.725**	**<.001**	**2.06**
<70 patients/week (vs. 70-99 patients/week)	--	--	--	--	--	--	--	--	**-.514**	**.001**	**-.485**	**.003**	**0.62**
Satisfaction variables*	--	--	--	--	--	--	--	--	--	--	--	--	--
Model Chi-square	3.158	.368	3.983	.046	8.306	.306	9.871	.016	55.6	<.001	116.6	<.001	
Model R-square (Nagelkerke)	.016		.020		.041		.048		.073		.148		

* None of the 15 satisfaction variables tested were individually related to retention within underserved practice sites at 2 years for these 1998 Remote Alumni.

Table 5 below summarizes the variables found in the statistical models of **Table 4** to be statistically related or not related to the 1998 Remote Alumni working within practices focused on the care for the underserved 2 years after their last NHSC service contracts was completed, adjusting for all other tested variables.

Table 5: Factors associated positively (+) and negatively (-) with working within practices that focus on care for the underserved 2 years beyond NHSC service terms for 1998 Remote Alumni, after controlling for all other factors

Features	Related to Work with the Underserved	Not Related to Work with Underserved
NHSC contract	• (+) 3 year NHSC contract (vs. 2 year contract)	• Loan Repayment vs. Scholarship Program • 4 year NHSC contract (vs. 2 year contract)
Motivation when joining NHSC	• (+) Strongly agree that they wanted a chance to provide care in underserved area	• None
Clinicians	• (-) Physician assistants	• No other disciplines • Gender • Age • Marital status
Community and site fit	• (+) Finding a site that met most professional needs	• Rural vs. urban • In a state where clinician was raised or trained
Work	• (+) Seeing 100 or more patients/week (vs. 70-99 patients) • (-) Seeing fewer than 70 patients/week	• Able to practice full scope of training
Satisfaction with aspects of job	• None	Satisfaction with 15 factors, including: • Salary • Fringe benefits • Night and weekend call duties • Access to specialists • Availability of locum tenens • Continuing education benefits

Factors associated with retention within NHSC service site 2 years beyond service terms for 2005 Recent Alumni.

A total of 45.9% of 2005 Recent Alumni were still working in their NHSC service sites 2 years after completing their last NHSC contract. Subgroups of variables correlated with site retention at 2 years are shown sequentially for features of the NHSC contract, the clinician's motivation in joining the NHSC, clinician demographics and discipline, the fit between the clinician and the site, the clinician's job, and the clinician's satisfaction with various aspects of their job and practice (**Table 6**). The variables statistically related (p<.10) to retention within each group of variables were then tested together to identify a final set of variables related to retention that accounted for all other variables (**Table 6, far right columns**).

Among the 2005 Recent Alumni, retention at 2 years within the last NHSC service site was greater for those who were 40 years of age and older when they started their NHSC service (O.R. 1.56), those who served in states where they grew up or trained (O.R. 1.66) and those who already had a specific site in mind when they were applying to the NHSC (O.R. 1.89). Site retention was also greater in practices were clinicians reported that they were satisfied with their relationship with the practice administrator (O.R. 2.25), satisfied with the support they received from other clinicians in the practice (O.R. 1.44) and satisfied with the physical condition of the facility (O.R. 1.53).

Among the 2005 Recent Alumni, the likelihood of being retained within NHSC service sites 2 years after completing NHSC service contracts was greater for those in the Loan Repayment Program than Scholarship Program (p<.001). But when the other factors were accounted for, the difference in retention lost statistical significance. This means that some of the other factors adjusted for in the full model explain why retention in service sites at 2 years is more likely for those in the Loan Repayment Program, perhaps group differences in the likelihood of serving in a state where they grew up or group differences in their relationships with their practice administrators.

Table 6: Retention of 2005 Recent Alumni within their NHSC service sites 2 years after service terms were completed Full and sequential partial logistic regression models of features of the NHSC contract, clinicians, the community and its fit with the clinicians, features of clinicians' work and their satisfaction with their job

	NHSC contract		**Motivations when joining NHSC**		**Clinician features**		**Community and site fit**		**Work features**		**Full Model**		
	Beta	*p*	Beta	*p*	beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Odds Ratio
Loan Repayment	**.910**	**.001**	--	--	--	--	--	--	--	--	.351	.26	1.42
"Strongly agree" that they wanted to provide care in an underserved area	--	--	112	.55	--	--	--	--	--	--	--	--	--
"Strongly agree" that they needed financial assistance	--	--	-.132	.50	--	--	--	--	--	--	--	--	--
Male (vs. female)	--	--	--	--	.310	.150	--	--	--	--	--	--	--
≤30 y.o. @ start of service (vs. 31-39 years of age)	--	--	--	--	**.395**	**.097**	--	--	--	--	.365	.157	1.44
≥40 y.o. @ start of service (vs. 31-39 years of age)	--	--	--	--	**.5648**	**.030**	--	--	--	--	**.470**	**0.070**	**1.56**
Married (vs. unmarried)	--	--	--	--	**.546**	**.018**	--	--	--	--	.382	.126	1.47
Dentist (vs. physician)	--	--	--	--	-.419	.23	--	--	--	--	--	--	--

Nurse practitioner (vs. physician)	--	--	--	--	-.098	.77	--	--	--	--	--	--	--
Nurse/Midwife (vs. physician)	--	--	--	--	.704	.16	--	--	--	--	--	--	--
Physician assistant (vs. physician)	--	--	--	--	.181	.54	--	--	--	--	--	--	--
Mental Health Prof. (vs. physician)	--	--	--	--	.368	.17	--	--	--	--	--	--	--
Other Health Prof. (vs. physician)	--	--	--	--	.761	.21	--	--	--	--	--	--	--
Rural site (vs. urban)	--	--	--	--	--	--	.182	.419	--	--	--	--	--
Frontier site (vs. urban)	--	--	--	--	--	--	.627	.163	--	--	--	--	--
Community/Migrant Health Center (vs. Misc. site types)	--	--	--	--	--	--	**-.420**	**.063**	--	--	-.259	.225	0.77
Rural Health Center (vs. Misc. site types)	--	--	--	--	--	--	-.200	.482	--	--	--	--	--
Site in state where clinician grew up and/or trained	--	--	--	--	--	--	**.737**	**<.001**	--	--	**.506**	**.021**	**1.66**
Important to work with a certain socio-economic or ethnic group	--	--	--	--	--	--	.057	.78	--	--	--	--	--
Important to work at specific, known site already in mind	--	--	--	--	--	--	**.715**	**.001**	--_	--	**.636**	**.003**	**1.89**

Important to work in a specific area, e.g., near family	--	--	--	--	--	--	.006	.98	--	--	--	--	--
Important to have ready access to specific activities, e.g., fishing, theater	--	--	--	--	--	--	-.054	.81	--	--	--	--	--
Satisfaction with relationship with practice administrator	--	--	--	--	--	--	--	--	**.1.19**	**<.001**	**.951**	**.001**	**2.25**
Satisfaction with physical condition of facility	--	--	--	--	--	--	--	--	**.508**	**.028**	**.423**	**.079**	**1.53**
Satisfaction with support from other clinicians in practice	--	--	--	--	--	--	--	--	**.370**	**.080**	**.362**	**.096**	**1.44**
Agrees that administrator is effective	--	--	--	--	--	--	--	**--**	**.654**	**.002**	.092	.71	1.10
Agrees that s/he is doing important work	--	--	--	--	--	--	--	--	**.843**	**.103**	.412	.44	1.51
Model Chi-square	14.07	.003	.169	.68	22.83	.01	40.28	<.001	29.07	<.001	83.38	<.001	
Model R-square (Nagelkerke)	.074		.001		.063		.110		.150		.223		

* These 5 satisfaction variables were selected using forward stepwise logistic regression from among the 16 satisfaction variables in the Recent Alumni questionnaire as those significantly associated with retention

Table 7 below summarizes the variables found in the statistical models of **Table 6** above to be statistically related or not related to the retention of the 2005 alumni in their service sites 2 years after their last NHSC service contracts are completed, adjusting for all other tested variables.

Table 7: Factors associated with retention within NHSC service sites 2 years beyond service terms for 2005 Recent Alumni, controlling for other factors, after controlling for all other factors

Features	Related to Work with Underserved	Not Related to Work with Underserved
NHSC contract	• (+) Loan Repayment Program	• none
Motivation when joining NHSC	• none	• Strongly agrees that they wanted a chance to provide care in underserved area • Strongly agrees that they needed financial assistance
Clinician Characteristics	• (+) Age 40 years or more	• Gender • Marital status • Discipline
Community and site fit	• (-) Community/Migrant Health Center • (+) In a state where clinician was raised or trained • (+) It was important to clinician to work in a specific, known site	• Rural vs. urban vs. frontier • It was important to clinician to work with a certain socio-economic or ethnic group; in a specific area; to have ready access to specific activities
Satisfaction with aspects of job	Satisfaction with: • (+) Relationship with administrator • (+) Physical condition of facility • (+) Support from other clinicians in the practice	Satisfaction with 13 other factors, including: • Administrator is effective • Salary • Work doesn't encroach on personal time • Feeling s/he is doing important work

Factors associated with retention within practices that focus on care for the underserved 2 years beyond service terms for 2005 Recent Alumni.

A total of 64.7% of 2005 Recent Alumni were working sites that focused on care for the underserved 2 years after completing their last NHSC contract. Subgroups of variables correlated with working in underserved-focused practices at 2 years are shown sequentially for features of the NHSC contract, the clinician's motivation in joining the NHSC, clinician demographics and discipline, the fit between the clinician and the site, the clinician's job, and the clinician's satisfaction with various aspects of their job and practice (**Table 8**). The variables statistically related (p<.10) to retention within each group of variables were then tested together to identify a final set of variables related to retention that accounted for all other variables (**Table 8, far right columns**).

Among the 2005 alumni, the likelihood of working in a practice focused on the care of the underserved 2 years after NHSC service contracts were completed were greater for clinicians who served in the Loan Repayment Program than Scholarship Program (O.R. 1.73). Working in underserved-focused practices was also more likely for those who served in states where they grew up or trained (O.R. 1.48) and in practices where they with satisfied with their relationship with the administrator (O.R. 1.83), they felt supported by other clinicians (1.53) and were able to practice full scope of services for which they were trained (1.62).

Table 8: Retention of 2005 Recent Alumni in a practice focused on care for the underserved 2 years after NHSC service terms were completed. Full and sequential partial logistic regression models of features of the NHSC contract, clinicians, the community and its fit with the clinician, features of clinicians' work and their satisfaction with their job

	NHSC contract		**Motivations when joining NHSC**		**Clinician features**		**Community and site fit**		**Work features**		**Full Model**		
	Beta	*p*	Beta	*p*	beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Odds Ratio
Loan Repayment	**.852**	**.001**	- -	- -	- -	- -	- -	- -	- -	- -	.548	**.052**	**1.73**
"Strongly agree" that they wanted to provide care in an underserved population area	- -	- -	.285	.15	- -	- -	- -	- -	- -	- -	- -	- -	- -
"Strongly agree" that I needed financial assistance to pay off educational debt"	- -	- -	.028	.89	- -	- -	- -	- -	- -	- -	- -	- -	- -
Male (vs. female)	- -	- -	- -	- -	.244	.30	- -	- -	- -	- -	- -	- -	- -
≤30 y.o. @ start of service (vs. 31-39 years of age)	- -	- -	- -	- -	-201	.42		- -	- -	- -	- -	- -	- -
≥40 y.o. @ start of service (vs. 31-39 years of age)	- -	- -	- -	- -	.070	.80	- -	- -	- -	- -	- -	- -	- -
Married (vs. unmarried)	- -	- -	- -	- -	**.566**	**.015**	- -	- -	- -	- -	.350	.152	1.42
Dentist (vs. physician)	- -	- -	- -	- -	-.148	.68	- -	- -	- -	- -	- -	- -	- -
Nurse practitioner (vs. physician)	- -	- -	- -	- -	.011	.98 -	- -	- -	- -	- -	- -	- -	- -

Nurse/Midwife (vs. physician)	--	--	--	--	.440	.39		--	--	--	--	--	--
Physician assistant (vs. physician)	--	--	--	--	.444	.18	--	--	--	--	--	--	--
Mental Health Prof. (vs. physician)	--	--	--	--	.294	.32	--	--	--	--	--	--	--
Other Health Prof. (vs. physician)	--	--	--	--	-.013	.98	--	--	--	--	--	--	--
Rural site (vs. urban)	--	--	--	--	--	--	.177	.46	--	--	--	--	--
Frontier site (vs. urban)	--	--	--	--	--	--	-.178	.70	--	--	--	--	--
Community/Migrant Health Center (vs. Misc. site types)	--	--	--	--	--	--	**-.374**	**.122**	--	--	-.255	.25	0.78
Rural Health Center (vs. Misc. site types)	--	--	--	--	--	--	-.053	.861	--	--	--	--	--
Site in state where grew up and/or trained	--	--	--	--	--	--	**. 569**	**.007**	--	--	**.392**	**.079**	**1.48**
Important to work with a certain socio-economic or ethnic group	--	--	--	--	--	--	**.487**	**.024**	--	--	.311	.167	1.37
Important to work at specific, known site already in mind	--	--	--	--	--	--	.195	.383	--_	--	--	--	--
Important to work in a specific area, e.g., near family	--	--	--	--	--	--	-.091	.70	--	--	--	--	--
Important to have ready access to specific activities, e.g., fishing, theater	--	--	--	--	--	--	.168	.47	--	--	--	--	--

Good relationship w/ administrator	- -	- -	- -	- -	- -	- -	- -	- -	**.748**	**.003**	**.604**	**.012**	**1.83**
Satisfaction with support from other clinicians	- -	- -	- -	- -	- -	- -	- -	- -	**-.481**	**.048**	**.426**	**.056**	**1.53**
Agrees able to provide full scope of services	- -	- -	- -	- -	- -	- -	- -	**- -**	**.545**	**.051**	**.481**	**.073**	**1.62**
Model Chi-square	14.07	.003	.169	.681	12.12	.28	20.11	.017	29.07	<.001	46.72	<.001	
Model R-square (Nagelkerke)	.074		.001		.037		.061		.150		.140		

* These 3 satisfaction variables were selected using forward stepwise logistic regression from among the 16 satisfaction variables in the Recent Alumni questionnaire as those significantly associated with retention

Table 9 below summarizes the variables found in the statistical models of **Table 8** to be statistically related or not related to the 2005 alumni working in practices that focused on the care of the underserved 2 years after their last NHSC service contracts are completed, adjusting for all other tested variables.

Table 9: Factors associated with working within practices that focus on care for the underserved 2 years beyond NHSC service terms for 2005 Recent Alumni, after controlling for all other factors

Features	Related to Work with Underserved	Not Related to Work with Underserved
NHSC contract	• (+) Loan Repayment Program	• none
Motivation when joining NHSC	• none	• Strongly agrees that they wanted a chance to provide care in underserved area • Strongly agrees that they needed financial assistance
Clinicians	• none	• Gender • Age • Marital status • Discipline
Community and site fit	• (+) In a state where clinician was raised or trained	• Rural vs. urban vs. frontier • Type of NHSC site • Importance of working with specific socio-economic group; in a specific site in mind; in a specific area; to have ready access to certain activities
Satisfaction with aspects of job	Satisfaction with: • (+) Relationship with administrator • (+) Support from other clinicians in the practice • (+) Able to provide full scope of services	Satisfaction with 13 other factors, including: • Administrator is effective • Salary • Work doesn't encroach on personal time • Feeling s/he is doing important work

Factors associated with retention within NHSC service site 10 years beyond service terms for 1998 Remote Alumni.

A total of 18.0% of 1998 Remote Alumni were working in practices that they report focused on the care of the underserved 10 years after completing their last NHSC contract. Subgroups of variables correlated with site retention at 10 years are shown sequentially for features of the NHSC contract, the clinician's motivation in joining the NHSC, clinician demographics and discipline, the fit between the clinician and the site, the clinician's job, and the clinician's satisfaction with various aspects of their job and practice (**Table 10**). The variables statistically related (p<.10) to retention within each group of variables were then tested together to identify a final set of variables related to retention that accounted for all other variables (**Table 10, far right columns**).

Among the 1998 Remote Alumni, the likelihood of being retained within NHSC service sites 10 years after completing NHSC service contracts was greater for those in the Loan Repayment Program than Scholarship Program (O.R. 2.79) and those when surveyed in 1998 reported that they provided care to 100 or more patients each week (O.R. 5.67) and were satisfied with their practice's reputation in the community (O.R. 7.74).

Table 10: Retention of 1998 Remote Alumni within their NHSC service sites 10 years after service terms were completed. Full and sequential partial logistic regression models of features of the NHSC contract, clinicians, the community and its fit with the clinician, features of clinicians' work and their satisfaction with their job

	NHSC contract		Motivations when joining NHSC		Clinician features		Community and site fit		Work features		Full Model		
	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Odds Ratio
Loan Repayment	**1.048**	**.015**	--	--	--	--	--	--	--	--	**1.027**	**.037**	**2.79**
3 yr. obligation (vs. 2 year)	-.402	.446	--	--	--	--	--	--	--	--	--	--	--
4 yr. obligation (vs. 2 year)	-.180	.737	--	--	--	--	--	--	--	--	--	--	--
"Strongly agree" that when considering the NHSC they wanted "a chance to provide health care in an underserved area"	--	--	-.284	.387	--	--	--	--	--	--	--	--	--
Male (vs. female)	--	--	--	--	-.281	.424	--	--	--	--	--	--	--
≤30 y.o. @ start of service (vs. 31-39 years of age)	--	--	--	--	**.621**	**.099**	--	--	--	--	.571	.130	1.77
≥40 y.o. @ start of service (vs. 31-39 years of age)	--	--	--	--	.289	.521	--	--	--	--	--	--	--
Dentist (vs. physician)	--	--	--	--	-.838	.121	--	--	--	--	--	--	--

Nurse practitioner/midwife (vs. physician)	--	--	--	--	-.538	.302	--	--	--	--	--	--	--
Physician assistant (vs. physician)	--	--	--	--	**-.881**	**.100**	--	--	--	--	-.374	.515	.69
Rural site (vs. urban)	--	--	--	--	--	--	.888	.117	--	--	--	--	--
Site in state where grew up and/or trained	--	--	--	--	--	--	**.845**	**.022**	--	--	.370	.374	1.45
Found site that met most professional needs	--	--	--	--	--	--	.588	.103	--	--	--	--	--
Able to practice full scope	--	--	--	--	--	--	--	--	1.154	.151	--	--	--
≥100 patients/week (vs. 70-99 patients/week)	--	--	--	--	--	--	--	--	**1.219**	**.005**	**1.297**	**<.001**	**5.67**
<70 patients/week (vs. 70-99 patients/week)	--	--	--	--	--	--	--	--	-.467	.386	--	--	--
Sat w/ Clerical and admin-istrative support*	--	--	--	--	--	--	--	--	-.090	.841	--	--	--
Sat w/ financial stability of the practice*	--	--	--	--	--	--	--	--	-.471	.268	--	--	--
Sat w/ the triage system for patient care *	--	--	--	--	--	--	--	--	-.531	.198	--	--	--
Sat w/ total compensation*	--	--	--	--	--	--	--	--	.196	.671	--	--	--
Satisfaction w/practice's reputation in the local community*	--	--	--	--	--	--	--	--	**2.275**	**<.001**	**2.047**	**.001**	**7.74**

Sat w/ flexibility of daily clinical schedule*	`- -	- -	- -	- -	- -	- -	- -	- -	.578	.201	- -	- -	- -
Sat w/ weekend call duties*	- -	- -	- -	- -	- -	- -	- -	- -	.446	.309	- -	- -	- -
Model Chi-square; p-value	9.321	.025	.753	.385	8.475	.205	11.977	.007	45.429	<.001	43.013	<.001	
Model R-square (Nagelkerke)	.058		.005		.053		.074		.274		.259		

* These seven satisfaction variables were selected using forward stepwise logistic regression from among the 15 satisfaction variables in the Remote Alumni questionnaire (fielded in 1998) as the seven variables significantly associated with retention.

Factors associated with retention within practices focused on care for the underserved 10 years beyond service terms for 1998 Remote Alumni.

A total of 55.4% of 1998 Remote Alumni were working in practices that they report focused on the care of the underserved 10 years after completing their last NHSC contract. Subgroups of variables correlated with site retention at 10 years are shown sequentially for features of the NHSC contract, the clinician's motivation in joining the NHSC, clinician demographics and discipline, the fit between the clinician and the site, the clinician's job, and the clinician's satisfaction with various aspects of their job and practice (**Table 11**). The variables statistically related (p<.10) to retention within each group of variables were then tested together to identify a final set of variables related to retention that accounted for all other variables (**Table 11, far right columns**).

Among the 1998 Remote Alumni, the likelihood of working in a practice that focused on care for the underserved 10 years after completing NHSC service contracts was greater for those who were not physician assistants (O.R. relative to physicians, 0.55) and those who back in 1998 reported that they were seeing 100 or more patients each week (O.R. 1.97).

Table 11: Retention of 1998 Remote Alumni within practices that focus on care for the underserved 10 years after service terms were completed. Full and sequential partial logistic regression models of features of the NHSC contract, importance to clinician of providing care to underserved, clinician features, the community and its fit with the clinician, features of clinicians' work and their satisfaction with their job

	NHSC contract		**Motivations when joining NHSC**		**Clinician features**		**Community and site fit**		**Work features**				**Full Model**
	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Beta	*p*	Odds Ratio
Loan Repay	.125	.670	- -	- -	- -	- -	- -	- -	- -	- -	-	- -	- -
3 yr. obligation (vs. 2 year)	.336	.373	- -	- -	- -	- -	- -	- -	- -	- -	-	- -	- -
4 yr. obligation (vs. 2 year	.607	.216	- -	- -	- -	- -	- -	- -	- -	- -	. -	- -	- -
"Strongly agree" that when considering the NHSC they wanted "a chance to provide health care in an underserved area"	- -	- -	**.483**	**.061**	- -	- -	- -	- -	- -	- -	**.**328	.221	1.39
Male (vs. female)	- -	- -	- -	- -	.063	.824	- -	- -	- -	- -	- -	- -	- -
Married	- -	- -	- -	- -	.412	.151	- -	- -	- -	- -	- -	- -	- -
≤30 y.o. @ start of service (vs. 31-39 years of age)	- -	- -	- -	- -	.158	.614	- -	- -	- -	- -	- -	- -	- -
≥40 y.o. @ start of service (vs. 31-39 years of age)	- -	- -	- -	- -	.139	.614	- -	- -	- -	- -	- -	- -	- -

Dentist (vs. physician)	--	--	--	--	-.444	.323	--	--	--	--	--	--	--	
Nurse practitioner/midwife (vs. physician)	--	--	--	--	.062	.872	--	--	--	--	--	--	--	
Physician assistant (vs. physician)	--	--	--	--	**-.707**	**.060**	--	--	--	--	**-.604**	**.095**	**0.55**	
Rural site (vs. urban)	--	--	--	--	--	--	.093	.725	--	--	--	--	--	
Site in state where grew up and/or trained	--	--	--	--	--	--	.162	.527	--	--	--	--	--	
Found site that met most up and/or trained professional needs	--	--	--	--	--	--	-.016	.964	--	--	--	--	--	
Able to practice full scope	--	--	--	--	--	--	--	--	-.152	.637	--	--	--	
≥100 patients/week (vs. 70-99 patients/week)	--	--	--	--	--	--	--	--	**.622**	**.051**	**.678**	**.018**	**1.97**	
<70 patients/week	--	--	--	--	--	--	--	--	-.191	.652	--	--	--	
Satisfaction variables*	--	--	--	--	--	--	--	--	--	--	--	--	--	
Model Chi-square	2.284	.516	3.531	.060	5.439	.489	4.80	.923	6.783	.081	11.393	.010		
Model R-square (Nagelkerke)	.012		. 019		.041		.003		.037		.062			

* None of the 15 satisfaction variables tested was individually related to retention within underserved practice sites at 10 years for these 1998 Remote Alumni

Is how well the family's social, employment and educational needs are met related to clinicians' retention?

Three-quarters of the 2005 Recent Alumni reported that they were married while serving in the NHSC. When clinicians indicated on several questionnaire items that their service community met their spouses' and children's' needs, retention percentages at 2 years were higher among these 2005 Alumni, within both the NHSC service site and generally also in practices that focus on care for the underserved (**Table 12**). For example, among the 2005 Recent Alumni, retention within the NHSC service site was 58.9% for those who reported that their spouse was happy in the community versus 32.7% for clinicians who were neutral or disagreed that their spouse was happy. Similarly, feeling safe in the community was also related to retention, with only 36.7% remaining in their service site at 2 years if their family was concerned about safety versus 54.6% if safety was not a concern for families.

Table 12: Percentages of 2005 Recent Alumni retained 2 years beyond their NHSC service terms, by whether they agreed that their communities served their spouses' and children's needs.

	Retained in NHSC Service Site @ 2 Years			Working in Practice Focused on Care for the Underserved @ 2 Years		
	Agree	Neutral & Disagree	p-value	Agree	Neutral & Disagree	p-value
"My spouse/partner was happy in the community."	58.90%	32.70%	<.001	75.60%	50.50%	<.001
"Satisfactory professional opportunities for my spouse/partner were available in the community."	56.70%	39.60%	0.002	72.50%	59.40%	0.015
"My children were happy in the community."	59.80%	40.00%	0.013	77.30%	57.40%	0.007
"Satisfactory educational opportunities for my children were available in the community."	65.20%	40.00%	<.001	76.00%	64.40%	0.07
"My family was concerned about personal safety in the community."	36.70%	54.60%	0.003	53.40%	72.10%	0.001

Two-thirds of the 1998 Remote Alumni reported that they were married when they served in the NHSC. The relationship between families being satisfied and having their needs met in the community with clinicians' retention was more complex for these 1998 Alumni than for the 2005 Alumni (**Table 13**). For the 1998 Alumni, clinicians who indicated that their spouses were happy in the community were more likely to remain in their service sites at 2 years than those whose spouses were reportedly not satisfied (53.9% vs. 23.0%, respectively). Similarly, those with satisfied spouses were more likely two years out to be working in practices that focused on care for the underserved (72.4% vs. 58.5%). And fewer clinicians who reported that the community was likely to be a problem for their families if they stayed remained in their service sites than if clinicians reported that the community was not a problem for the family (30.5% vs. 57.5%, respectively).

Table 13: Percentages of 1998 Remote Alumni retained 2 years beyond their NHSC service terms, by whether they agreed that their communities served their spouses' and children's needs.

	Retained in NHSC Service Site @ 2 Years			Working in Practice Focused on Care for the Underserved @ 2 Years		
	Agree	Neutral & Disagree	p-value	Agree	Neutral & Disagree	p-value
"My spouse/partner was happy in the community where we live for my NHSC service."	53.90%	23.00%	<.001	72.40%	58.50%	0.001
"Satisfactory professional opportunities for my spouse are available in the community where we live for my NHSC service."	45.30%	41.10%	0.29	69.20%	68.80%	0.92
"My children are happy in the community where we live for my NHSC service."	51.10%	45.90%	0.31	66.80%	81.90%	0.001
"Satisfactory educational opportunities for my children are available in the community where we live for my NHSC service."	47.70%	50.70%	0.51	65.40%	78.30%	0.001
"Staying in this community is likely to be a problem given my current family situation."	30.50%	57.50%	<.001	62.90%	74.80%	<.001

On the other hand, among the 1998 Remote Alumni agreement that there were professional opportunities for spouses was not related to clinicians' retention rates in service sites at 2 years or in practices focused on underserved care. Children's reported happiness in the community and its educational opportunities were also not related to retention in service sites and were inversely related to likelihood of working in a practice focused on underserved care at two years.

Some site retention differences associated with family situation persisted after 10 years (data not shown). For example clinicians who indicated that their spouses were happy in the community were more likely to remain in their service sites at 10 years than those whose spouses were reportedly not satisfied (43.0% vs. 20.8%, respectively). Similarly, fewer clinicians who reported that the community was likely to be a problem for their families if they stayed actually remained in their service sites 10 years after their service obligation was completed than did those clinicians who reported that the community was not a problem for the family (24.8% vs. 43.8%, respectively). On the other hand, no family situation variables were related to 10 year retention in any underserved area; the proportions remaining in any underserved practice were remarkably close to 50% at 10 years for all clinicians whether or not they identified any family related issues in their 1998 survey.

THIRD STUDY QUESTIONS - How important to retention is the sense of being supported by the NHSC? What role does customer service play in NHSC program structure/organization regarding retention?

Associations between retention and clinicians' views of the NHSC and their NHSC experience were tested within the 2005 Recent Alumni cohort. Four items related to perceptions of the NHSC staff and clinicians' experiences in the NHSC were included on the questionnaire. These items are presented below (**Tables 14-17**), along with the response distributions and the percentages of clinicians with each response who remained at their NHSC service site and/or were working in a practice focused on care for the underserved 2 years after completing their NHSC service.

Clinicians who rated higher their satisfaction with the contacts and support they received from NHSC staff were more likely to remain 2 years in their service sites and within practices that focus on underserved care (**Table 14**). Similarly feeling appreciated by NHSC staff and having a higher overall satisfaction with the NHSC experience were also associated with higher likelihood of retention in the NHSC service site and in underserved-focused practices (**Tables 15 and 16**). Lastly, the higher the Loan Repayment or Scholar Program was rated as "exceeding expectations" the more likely clinicians were to be retained in their service sites and in underserved-focused sites at 2 years (**Table 17**).

Table 14: Rated satisfaction with "the contacts and other support you received from NHSC staff"

Response scale	% of responses	% who remained in service site at 2 years	% working in underserved-focused practice at 2 years
1 --Very dissatisfied	9%	26.2%	42.9%
2	9%	28.9%	53.3%
3 – Neutral	20%	45.9%	69.6%
4	30%	43.5%	63.0%
5 – Very satisfied	31%	58.0%	73.0%
	100%		
p-value		<.001	.002

Table 15: Rated agreement with the statement, "I felt appreciated by NHSC staff for my work"

Response value	% of responses	% who remained in service site at 2 years	% working in underserved-focused practice at 2 years
1 --Strongly disagree	15%	32.4%	41.5%
2	11%	42.6%	53.7%
3 – Neutral	35%	48.8%	70.2%
4	18%	42.0%	74.0%
5 – Strongly agree	21%	53.8%	70.1%
	100%		
p-value		.056	<.001

Table 16: Satisfaction rating (11-point scale) of the statement, "Considering all of the experiences you have had with the NHSC Scholarship/Loan Repayment Program, how satisfied are you with this program?"

Response value	% of responses	% who remained in service site at 2 years	% working in underserved-focused practice at 2 years
0-3—Dissatisfied	7.9%	25.6%	39.5%
4-6 –Neutral	7.5%	35.0%	44.7%
7-8 Satisfied	27.1%	49.6%	62.8%
9-10—Very Satisfied	57.5%	49.1%	73.9%
	100%		
p-value		.017	<.001

Table 17: Rating of meeting expectations (11-point scale) with the statement, "To what extent did the NHSC Scholarship/Loan Repayment Program fall short of or exceed your expectations?

Response values	% of responses	% who remained in service site at 2 years	% working in underserved-focused practice at 2 years
0-4—Fell Short of Expectations	15.5%	29.3%	45.6%
5 – Met Expectations	25.1%	55.8%	70.8%
6-8 Exceeded Expectations	26.4%	44.5%	60.9%
9-10—Far Exceeded Expectations	26.5%	48.6%	78.7%
	100%		
p-value		.002	<.001

What factors account for the retention differences of NHSC Scholars and Loan Repayors?

In both 1998 and 2005, clinicians serving in the Loan Repayment Program were more likely to be retained within their service sites 2 years after their NHSC service terms were completed (see **Figures 4 and 5** above and **Table 18** below). For the 2005 Recent Alumni, there was a similar pattern of more alumni of the Loan Repayment than Scholarship Program working within sites that focused on care for the underserved 2 years after service terms, but no difference for 1998 Remote Alumni in the percentages working in practices that emphasized care for the underserved at 2 years.

Table 18: Comparisons of percentages of clinicians in the Loan Repayment versus Scholarship Programs retained at 2 years within their NHSC service sites and within practices focused on care for the underserved

	1998 Remote Alumni			2005 Recent Alumni		
	Scholarship	Loan Repay	*p*-value	Scholarship	Loan Repay	*p*-value
In service site	32.4%	56.1%	<.001	28.6%	49.9%	<.001
In practice focused on underserved care	68.1	67.6	.89	47.7%	68.6%	<.001

Adjusting for the many variables of the multivariate models of **Tables 2, 6 and 8** only partially explains the Loan Repayment vs. Scholarship Program retention differences at 2 years (**Table 19**). Specifically, adjusting for the significant retention effects found for variables that reflect the fit between clinicians and their sites (e.g., whether they found sites that met their professional needs, whether they served in a state where they grew up or trained), features of their practices (seeing more patients per day;) and satisfaction with various aspects of the practices (e.g., the practice's reputation in the community, and the relationship with the administrator) was found to account for just 22% of the relative odds of retention in service sites for 1998 Scholars and Loan Repayors and 43% of the relative odds of service site retention for 2005 Scholars and Loan Repayors. These factors were also found to account for a quarter (26%) of the relative odds of Scholars versus Loan Repayors working in a practice focused on care for the underserved 2 years after their NHSC service terms. The remainder of the retention differences between Scholars and Loan Repayors remains unexplained.

Table 19: Reduction in odds ratios of differences in retention likelihood at 2 years within NHSC service sites and within practices focused on care for the underserved, for 1998 and 2005 Alumni

	1998 Remote Alumni			2005 Recent Alumni		
	Unadjusted Odds Ratio	Adjusted Odds Ratio	% reduction in OR	Unadjusted Odds Ratio	Adjusted Odds Ratio	% reduction in OR
In service site	2.62	2.05	22%	2.49	1.42 (n.s.)	43%
In practice focused on underserved care	- - *	- -	- -	2.35	1.73	26%

* there was no statistically significant difference among 1998 Remote Alumni between those in the Loan Repayment and Scholarship Programs.

STUDY LIMITATIONS

1. **Analyses of broad groups may mask associations for smaller groups.** For considerations of space and ease of analysis and presentation, the analyses conducted within this report are principally for clinician groups as a whole, e.g., for Loan Repayors and Scholars combined, and for clinicians of all disciplines combined. When various tested factors are found not be related to retention for the entire 1998 or 2005 alumni cohorts, it may still be the case that these factors are related to retention for certain, untested subgroups. This will require other, future focused analyses to identify.

2. **Potential for non-response bias.** As in any survey study, non-respondents may differ in important ways from respondents, on whom this study's findings are based. The greater than 50% response rates for this study's 1998 Remote Alumni, Current Clinician and Site Administrator groups compares favorably to response rates of other recent surveys of clinicians (Asch et al, 1997; Cummings et al, 2001); nevertheless, information on the retention and other experiences of the nearly 50% who did not respond may have differed. Potential for non-response bias is greatest for this study's 2005 Recent Alumni Scholar and Loan Repayor groups, which had the response rates of 30.0% and 22.6% respectively.

   Mitigating efforts and factors:

   a. The likely reason for a lower response rate for the 2005 Recent Alumni groups was that many never received the questionnaire because their email addresses obtained from the BMISS data files were not up to date: the BCRS is not obligated to contact its alumni and, therefore, hasn't needed to update contact information for them. We believe that response rates were twice as high for the Current NHSC clinicians because the NHSC has current email addresses for clinicians as they serve, as the NHSC regularly communicates with them. We believe response rates were also nearly double for the 1998 Remote Alumni group because we used on-line sources to find physical mailing addresses and then relied on the U.S. Mail for send-outs and return mailings, which also yielded higher contact rates. Thus, the true response rates—the proportions who responded among those who actually received the questionnaire—for the 2005 Recent Alumni group are likely significantly higher than the rates calculated.
   b. In order to test for response bias among the 1998 Remote Alumni, we used selected items from the 1998 survey to test for associations with response likelihood to the 2011 survey. These items included information on the demographic and professional backgrounds of these clinicians as well as indicators of their NHSC and site experiences as reported in the 1998 survey. Among the 65 items tested, a few were found to be statistically significant predictors of response to the more recent survey. Clinicians who are slightly over represented include physician assistants, those of Hispanic ethnicity, those who had a 3-year NHSC contract (as opposed to either a 2 or 4+ year contract), and those who reported a more favorable matching experience. Importantly, no associations with response were

found with gender, job satisfaction or longer expected retention. This pattern suggests that any response bias related to actual retention of the Remote Alumni is likely to be minimal and may be effectively dealt with through statistical adjustments (e.g., the statistical weights created for each discipline).

3. **Potential for non-contact bias.** In a study assessing job retention rates, it is important that people who have changed jobs are no less likely to be located and then successfully reached with the questionnaire (contacted) than those who did not change jobs. This can happen unintentionally if questionnaires are mailed to earlier sites of employment, if prior employers are contacted to verify or obtain current addresses and when emailed questionnaires are sent to email addresses that are issued through employers.

   Mitigating efforts and factors:

   For this study, we principally used individuals' email addresses contained on the BCRS's BMISS administrative files, supplement with email addresses from a national vendor and street addresses from national data sources. There is little reason to believe that addresses from these sources will be more accurate for those who are retained longer. We did not reach clinicians through prior work sites and these sites generally do not issue email addresses to their employees.

4. **Potential for social desirability bias.** Respondents have a tendency to respond to survey questions in ways that reflect well on them. For a survey of retention of NHSC clinicians, respondents might be expected to over-report that the places they have worked focus on the care for the underserved, over-report the number of Medicaid covered and uninsured patients in their practices, and over-report the importance to them of providing care for the underserved and their relationships with patients.

   Mitigating efforts:

   a. For this study, full and honest disclosure was encouraged by (1) having the survey identified as from the University of North Carolina and Quality Resource Systems, Inc. and mailings sent to and from QRS, rather than from the NHSC, (2) promising in a cover letter/message that the information that individuals provide will not be reported to the NHSC anonymously, and (3) initial cover letters asked respondents "to be candid in your comments" and asked for their participation whether or not "you are still working at your NHSC service site."
   b. Respondents' responses to open-ended questions about their experiences seemed to present a full range of opinions: they did not seem hesitant to report negative (socially undesirable) opinions.
   c. The questionnaire measure we used of query respondents about the number of future years they expect to remain within their practices has been used in prior studies and its general

accuracy demonstrated prospectively (Pathman et al, 2003).

5. **Potential for recall bias.** Although the same and similar items were asked of the current and both alumni cohorts, reports of experiences in the NHSC and subsequent work situations may be affected by imperfect recall, potentially biasing responses from some items for some groups. Imperfect recall is likely to be greatest for the Remote alumni, who generally completed their NHSC service from 10 to 12 years ago.

   Mitigating efforts and factors:

   a. Clinicians' service within the NHSC is typically important to them, and this salience makes this information less likely to be forgotten and their reports less subject to recall bias.
   b. Data on experiences while serving in the NHSC were not reported retrospectively for the 1998 Remote Alumni group, for whom this information was gathered through the 1998 survey when they were still serving, and for the 2010 Current Clinician group, for whom information was gathered in the 2011 at the time the great majority were serving.

6. **Omitted variables bias.** Analyses of factors associated with retention were only possible when the needed information was gathered through the questionnaires. The 1998 questionnaire, in particular, was limited in the factors of clinicians' work, family and backgrounds it queried that might be relevant to retention, e.g., clinicians' relationships with practice administrators and the quality of relationships among clinicians within the practice.

   Mitigating efforts and factors:

   a. The questionnaire for the 2005 Recent Alumni contained some of the seemingly important retention-related factors not included in the 1998 Remote Alumni questionnaire, which allowed these factors to be tested in this later group.

SUMMARY AND DISCUSSION OF FINDINGS

In this section the study's findings are summarized, interpreted and considered with respect to previous studies of the retention of NHSC and other clinicians. The discussion is organized around the original study questions (see pp. 2-3).

1. How long are NHSC clinicians retained beyond their service obligations within their service sites and in service to the medically underserved more generally?

1a. How does retention for NHSC clinicians serving in 2005 compare to those serving in 1998 and before?

For clinicians who served in the NHSC in 1998, 1 year after completing service obligations 60% remained in their service sites and 72% were working in sites that focused on care for the medically underserved more broadly. Retention in service sites and in the wider set of underserved-focused practices at 2 years was 48% and 68%, respectively, and at 4 years was 32% and 62%. Long-term retention within service sites was 22% at 7 years and 18% at 10 and 12 years. Twelve years after ending their NHSC service, one-half (50%) of NHSC clinicians were working in practices they reported focused on care for the medically-underserved.

One-year retention for clinicians who served in the NHSC seven years later, in 2005, was essentially the same as it was for clinicians who served in 1998: in 2005, 59% were retained in service-sites at 1 year and 71% were retained working in underserved-focused practices. Retention percentages at 2 through 4 years fell off slightly for 2005 alumni relative to 1998 alumni: service-site retention at 4-years was 26% for 2005 alumni versus 32% for 1998 alumni, and retention in underserved-focused practices at 4 years was 56% for the 2005 alumni versus 62% for 1998 alumni.

In contrast, short-term retention percentages were greater for 2005 alumni than for 1998 alumni. Within service sites, retention at 1 month was 80% for 2005 alumni versus 71% for 1998 alumni, and at 6 months service site retention for 2005 alumni was 68% compared to 64% for 1998 alumni. Similarly, percentages working in underserved-focused practices at 1 month were 82% for 2005 alumni and 72% for 1998 alumni, and at 6 months were 76% for 2005 alumni versus 72% for 1998 alumni.

Earlier studies. There have been no consistent definitions and approaches to measuring retention over the NHSC's history, so prior studies do not provide comparable data to permit direct comparisons of findings of one study against another or against the data of the current study. Nevertheless, comparisons are illuminating and generally suggest that retention has steadily improved for NHSC alumni over the decades:

- In the NHSC's previous, 1998 retention evaluation (Konrad et al, 2000), only 26.0% of NHSC alumni from the 1980s and early 1990s had remained in their NHSC service sites for 1 month following the completion of their service terms, compared to 68% 1 month service-site retention for the NHSC clinicians serving in 1998 and surveyed in the current study, and 80% 1 month retention in service sites for this study's 2005 NHSC clinicians. Further, the earlier evaluation reported that retention for 1980s and early 1990s alumni at 1 month within "any underserved site" was 64.4%, compared to the 72% rate found for the 1998 alumni and 82% for the 2005 alumni of this study. The earlier, 1998 report with data for alumni of the 1980s and early 1990s did not present retention rates for discrete points further out than 1 month after clinicians' service terms, e.g., at 6 months, 1 year and 5 years; therefore, there are no directly comparable retention rate figures beyond 1 month from this earlier study against which to compare retention rates from the current study.

- Singer et al (1998) used administrative data from the U.S. Bureau of Primary Health Care to reconstruct the employment histories of all 2,654 physicians who were working in community and migrant health centers nationwide at any point from January 1990 through September 1992. They found that five years after coming to a community/migrant health center, 36% of those who started work without a NHSC service contract were still working there, but only 17% of those who started working in a community/migrant health center with a NHSC contract (Scholarship or Loan Repayment) were still employed in their health centers. Given that the NHSC physicians in that study had 2, 3 and 4 year service obligations, this means that only 17% of this group was retained within their service sites 1 to 3 years after their service terms were complete, which is significantly less than the 39% service site retention rate at 3 years after service terms for the 1998 alumni of the current study, and 36% retention rate at 3 years for the 2005 alumni.

- In 1980, Pantell et al reported data on the proportions of all physicians, physician assistants and nurse practitioners who were working in eight Community Health Centers and other similar centers in underserved areas in the Pacific Northwest in the early 1970s. They found that half of the clinicians that began working in these sites left by 10 months after they started.

1b. How does retention compare for participants of the NHSC Scholarship and Loan Repayment Programs?

Among this study's 1998 alumni, retention rates within service sites was substantially greater at every point in time for those who had participated in the NHSC Loan Repayment Program relative to participants of the Scholarship Program. For example, the retained percentages of Loan Repayors and Scholars within service sites at 1 year were 71% versus 41%, respectively, and at 10 years were 23% versus 9%. Among the 1998 alumni, however, there were no meaningful differences between Loan Repayment and Scholarship Program alumni in the percentages who were working in practices that focused on care for the underserved. For example, a similar 62% and 63% of alumni of the Loan

Repayment and Scholarship Programs reported working in underserved-focused sites at 5 years. Thus, among NHSC clinicians serving in 1998, Scholarship Program alumni left their service sites much earlier than Loan Repayment Program alumni, but the two groups were equally likely to be working in the underserved-focused practices more broadly defined over time.

Among this study's 2005 alumni, retained proportions were greater over time for the Loan Repayment than the Scholarship Program both within services sites and also in practices addressing the underserved. For example, service site retention percentages at 2 years for Loan Repayment and Scholarship Program alumni were 50% and 29%, respectively, and retention within underserved-focused practices at 2 years for Scholarship and Loan Repayment alumni were 69% and 48%.

Earlier studies. The NHSC's previous, 1998 evaluation of retention for alumni of the 1980s and early 1990s similarly found that retention rates were higher for clinicians in the NHSC's Loan Repayment Program than Scholarship Program. Retention rates at 1 month within the service site were 57.2% for alumni from the 1980s and early 1990s from the Loan Repayment Program versus 20.7% for alumni of the Scholarship Program. One month retention within "any underserved site" also differed for the two programs, at 79.2% versus 61.9%, respectively. The report of the 1998 study also used survival analysis (which was not used in the current study, which was instead asked to compare retention as specific points in time) to show that retention examined over the years rather than at a single point in time was greater for Loan Repayment alumni than Scholarship alumni: the hazard ratio of leaving the service site averaged over time for Loan Repayors relative to Scholars was 0.72 (CI_{95} 0.58-0.89) and for leaving "any underserved site" of 0.63 (CI_{95} 0.43-0.93).

Retention for physician participants of *states'* scholarship and loan repayment programs has also been compared and the relative retention advantages of the loan repayment program model have also been found for these state programs (Pathman et al, 2004). Measured from the date physicians began serving within their programs, the hazard ratio of leaving one's service site over time was 1.96 (CI_{95} 0.97-3.97) for scholarship program participants relative to participants of loan repayment and similarly fashioned direct incentive programs.

1c. How does retention compare for clinicians serving within urban, rural and frontier communities?

For clinicians serving in the NHSC in 1998, those who served in settings classified by the NHSC as rural were more likely than those in urban settings to remain working in their service sites 1 year after their service terms were complete, and the rural advantage persisted thereafter. For example, at 1 year service site retention in rural settings was 63% versus 55% in urban settings and at 10 years was 21% versus 13%. [N.B. The 1998 study did not identify clinicians serving in frontier locations.]

For clinicians serving in the NHSC in 2005, those in urban, rural and frontier counties did not differ significantly or statistically in the percentages that remained within their service sites at any point in time.

Earlier studies. In the NHSC's previous, 1998 evaluation of retention, a retention advantage at both 1 month and over the longer term (with survival analysis) was found for those who served in rural areas in the 1980s and early 1990s, relative to alumni of that period who served in urban areas. Similarly, Horner et al (1993) found that primary care physicians working in rural and urban areas of North Carolina remained a comparable median of four and one-half years. In contrast, Singer et al (1998) found that retention was shorter in rural than urban community health centers.

Although some may find it surprising that retention is not shorter in rural settings—after all, practitioner shortages are generally more critical in rural areas compared to urban areas—it has been demonstrated that physician *retention* in shortage areas overall is comparable to that in non-underserved areas. All evidence suggests that shortage areas as a whole develop only because of lower *recruitment* rates, not lower retention rates (Pathman, Konrad, Dann and Koch, 2004).

1d. How does retention differ for clinicians of different disciplines?

This study finds that the percentages of clinicians retained in their NHSC service sites and working in practices that focused on care for the underserved differed statistically and meaningfully for those of the various disciplines. This was the case both for clinicians serving in 1998 and those serving in 2005; however, the particular disciplines with the highest and lowest retention rates at various points in time differed for the 1998 and 2005 cohorts. In 1998, physician assistants demonstrated the lowest and physicians demonstrated the highest retention rates at most points in time following their service terms, both within service practices and in medically underserved-focused practices more generally. Among the greater number of disciplines that participated in the NHSC in 2005, dentists demonstrated the lowest and physician assistants and mental health clinicians demonstrated the highest retention rates within service sites and in practices that focused on care for the underserved. It is important to note that disciplines differ in their distribution between the Scholarship and Loan Repayment Programs and that this distribution further varied across eras, e.g., 1990s versus 2000s. Further, some disciplines, most importantly the mental health disciplines, only participate in the Loan Repayment Program, so the generally more favorable retention of clinicians within this program over those in the Scholarship Program is in part responsible for the favorable retention found for disciplines restricted to the Loan Repayment Program.

Many factors will varyingly affect the work and family lives of clinicians of the different disciplines, which in turn can affect the likelihood that each will remain in their NHSC sites over time. For example, disciplines that are predominantly female, such as nurse practitioners, can be more prone to otherwise unanticipated relocations of families because of their male spouses' job requirements, which still often carry disproportionate importance in U.S. families' location decisions. The various disciplines also tend to work in different types of settings—e.g., the mental health disciplines often work within public mental health facilities—which can have unique staffing patterns, personnel policies and salary levels, which can in turn affect the likelihood of retention for their clinical staff. Alternative job opportunities also differ for the various disciplines, which mean that disciplines face differing enticements trying to pull them away to other work settings.

These various work and family factors will be affecting clinicians of the various disciplines at different points in time, which can mean that retention can be higher in the first year or two for one discipline relative to a second, but then new factors can come into play and the retention rates for the first discipline can shift to become lower than the second for subsequent years. Job markets, employment patterns, content of practice, educational loan debt, family financial challenges and even aspirations of newly trained clinicians can shift over time for the various disciplines, which means that the relative retention of NHSC alumni of various disciplines can shift over periods (Staiger et al, 2012). Some of these factors may explain why in this evaluation physician assistant alumni from 1998 demonstrated the lowest retention whereas physician assistant alumni from 2005 demonstrated among the highest retention.

Earlier studies. In the NHSC's previous, 1998 evaluation of retention, among alumni of the 1980s and early 1990s, retention at 1 month was found to be lowest among physicians and highest among physician assistants, but retention over time within underserved-focused practices was found to be lowest for physician assistants.

2. What factors influence retention beyond the service term within the service site and in service to the medically underserved? Specifically, how is retention related to: (i) the fit between clinicians and the sites they choose, and (ii) aspects of clinicians' work?

2a. How do these factors differ now from those for alumni of the 1980s and early 1990s reported in the 2000 study report?

2b. How do these factors differ in explaining retention beyond two years versus explaining retention beyond ten years?

2c. What factors account for the retention differences of NHSC Scholars and Loan Repayors?

Three types of factors were most consistently related to the proportions of NHSC clinicians from both 1998 and from 2005 that were retained within their NHSC service sites two years after their NHSC service terms. Those with higher retention rates at two years were:

- ***Loan Repayors (relative to Scholars).***

  Loan Repayors remained in their service sites at two years (and all other points in time) in greater proportions than Scholars. The differences were substantial, e.g., service site retention rates at two years of 49.9% for Loan Repayors versus 28.6% for Scholars. A similar large retention difference for Loan Repayors and Scholars was noted in the 2000 report for alumni from the 1980s and early 1990s

(Konrad et al, 2000) and in another study of alumni of states' own loan repayment and scholarship programs (Pathman, Konrad, King, et al 2004).

Adjusting for all pertinent factors for which data were available from the 1998 survey reduced the difference in the relative odds of Loan Repayors and Scholars remaining in their service sites at two years by 22%, but 78% of the difference remained. Adjusting for the greater number of factors available on the questionnaire from the current survey for the 2005 alumni reduced the relative odds of retention for Loan Repayors and Scholars 43%, and the 57% apparent difference remaining was no longer statistically significant given the sample size. Thus, adjusting for variables like differences in the fit between clinicians and their sites, for clinicians' satisfaction with various aspects of work, and for the other factors included in the analyses accounts for a significant portion of the retention differences between Loan Repayors and Scholars. The analyses of this report did not identify which specific variables within the groups of variables evaluated explain those retention differences.

The fact that some retention difference remains between Loan Repayors and Scholars after adjusting for these other factors suggests that there are still other factors not queried in the questionnaires that are also important. Many believe that the basic design differences between loan repayment and scholarship programs in general will mean that fewer scholarship program alumni can be expected to remain within their service sites after their contractual obligations are fulfilled. The important perceived difference is that because participants commit to loan repayment programs when their training is complete, they are more likely to know what their professional interests and families' needs are and also know where they will serve before they commit to the program. In contrast, participants of scholarship programs commit earlier in their careers when they are still students and can be less certain what their professional interests and families' needs will later be when they complete their training and are then ready to serve. Further, they have no way of knowing what eligible service sites will be available when they are ready to enter into their obligation.

- ***Those who were better matched to their service sites*, i.e., those whose service sites were within states where they had grown up and/or trained and those who reported that their service site met most of their professional needs.**

  The importance of the clinician-site match has been demonstrated in prior NHSC retention studies (Pathman and Konrad 1992; Pathman, Konrad and Ricketts 1992; Pathman, Konrad and Ricketts 1994). Familiarity, comfort and shared values with the community's people and institutions are important to retention. An important community concept in retention is "place integration", where clinicians feel a part of the community and its people (Cutchin 1997a; Cutchin 1997b). Clinicians also need to feel they fit the practice and job in broad ways such as shared mission, values and role expectations. A clinician who feels their professional interests are not served in a current job—the scope of services, the level of responsibility, the type of patients and growth opportunities—will look elsewhere for a work setting that does meet these needs.

- ***Those who reported they were satisfied with selected aspects of their job and practice.*** The areas of satisfaction queried in the current survey for the 2005 alumni were broader than the factors queried in the 1998 survey, and they targeted more of the factors found important to retention in previous studies; thus satisfaction with more aspects of the job were associated with retention for the 2005 alumni than the 1998 alumni.

  The importance of workers' satisfaction to their job retention is well demonstrated for numerous fields, including in the healthcare professions. What is also known is that satisfaction with only some aspects of one's job and work predicts retention, not satisfaction with each and every aspect of one's position (Pathman, Williams and Konrad, 1996). Thus, studies must ask clinicians about their satisfaction with specific aspects of the job and practice and then correlate each with whether the clinicians stayed in or left their practices after adjusting for other areas of satisfaction to know which are related to retention.

  Satisfaction with one's relationships with others, professional autonomy and control of one's time, professional fulfillment, connections with one's patients and having adequate time away from work are the facets of work satisfaction most often found to be related to retention (Pathman, Konrad, Williams, Scheckler et al, 2002; Buchbinder et al 2001; Pathman, Williams and Konrad, 1996; Linzer et al, 2000). In the current study of NHSC retention, for the 2005 cohort for whom more pertinent facets of satisfaction were queried, satisfaction with the relationship with the practice administrator, with the support one feels from other clinicians and with the physical condition of the facility were each independently related to retention in the service site. These findings stress the importance to NHSC clinicians of within-practice relationships. Interestingly, although believing the practice's administrator is effective was found to be related to longer retention, this association was lost when analyses controlled for clinicians' satisfaction with their relationship with the administrator. This suggests that an administrator's ability to build good relationships with clinicians is more important to their retention than their perceived effectiveness otherwise as an administrator.

  Seemingly important facets of satisfaction found not to be related to retention at 2 years in the current study included clinicians' satisfaction with their income and benefits and their access to consultants for their patients. In terms of access to consultants, this is a frequent concern for primary care clinicians who work within clinics that provide care for at-risk and often uninsured populations, for whom there is frequently no mechanism (funding) for having these patients seen for specialty care. Although this frustrates the primary care clinician, it is generally not a reason for them to change practices, which would add insult to injury for their patients who would then lose primary care access on top of having no specialty care access. Similarly, although clinicians and all workers often complain about their income, evidence in this and previous studies of NHSC and other clinicians in underserved-focused practices suggests that it is not a principal reason for the unique clinicians who pursue this type of career to change practices (Pathman, Williams and Konrad, 1996; Pathman, Konrad, Williams, Scheckler et al, 2002).

It was interesting to see that 2005 alumni who were 40 years of age and older when they began serving in the NHSC and/or were married were more likely still to be working in their service sites two years following their service terms (**Table 6**). Singer et al (1998) previously also found in the early 1990s that retention rates were significantly higher for older than younger physicians in community and migrant health centers, both for physicians serving in the NHSC and non-NHSC physicians. Greater practice location stability with increasing age has also been shown for physicians generally (Pathman, Konrad, Williams, et al, 2002).

Not surprisingly, many of the same factors related to retention within service sites at two years were also related to retention within practices that focused on care for the underserved generally at two years. At two years, more than two-thirds of both the 1998 and 2005 alumni who were classified as working in a practice focused on underserved-care were still in their NHSC service site. For the 1998 alumni, these same factors included seeing 100 or more patients each week while serving and being in a site that met most professional needs; for 2005 alumni these factors included serving in a state where one grew up or trained, satisfaction with the service practice administrator and satisfaction with support from other clinicians in the service practice. But other factors affecting retention in service sites and in underserved-focused practices in general might be that, for example, clinicians who can successfully relate to the administrators of their service sites are also more often able to relate to the administrator of their next practice, and those who are busier in their first site are also more often busier in their next sites.

Factors related to retention at 10 years. Factors related to retention of the 1998 alumni 10 years after they completed their last NHSC contracts were generally similar to the factors related to retention at 2 years. Like at 2 years, Loan Repayment Program alumni were more likely to have remained for 10 years at their service sites (23%) than were Scholarship Program alumni (9%) and no more likely to be working within practices that focus on care for the underserved at 10 years (56% vs. 54%), as was the case at 2 years. Also like at 2 years, at 10 years physician assistants were still the least likely of the disciplines to be retained at their service sites and in practices that focus on underserved care. Similarly, physicians were the most likely of disciplines to be retained both at 2 years and 10 years within their service sites and practices that focused on care for the underserved.

Alumni from 1998 who strongly agreed that providing health care in an underserved area was a consideration when they joined the NHSC were more likely to be working in practices focused on care for the underserved at 2 years and also still at 10 years after they completed their NHSC contracts. The fact that clinicians' declared interest in working with underserved populations when they are serving in the NHSC is associated with least a decade of such service is quite remarkable. This suggests that early and accurate assessment of clinicians' "mission concordance" is important for assessing prospects for long term retention.

As seen for retention at 2 years, 1998 alumni who remained 10 years in their service sites were more likely to have served in a state where they grew up or trained. Similar to retention at 2 years, site retention at 10 years tended to be greater in rural versus urban sites (p=.10) and for those who felt their

NHSC service site met most of their professional needs (p=.12). Thus, a good match between the clinician and site pays dividends in better retention for at least a decade out.

Also similar to site retention at 2 years, alumni who remained 10 years in their service sites more often saw more than 100 patients a week when they served in the NHSC and more often where satisfied with their practice's reputation in the local community. The latter suggests that retention is more likely in both the short and long term in well-organized practices.

Is retention related to whether family's social, employment and educational needs are met in the community?

Among both the 1998 and 2005 NHSC cohorts, two-thirds were married and many had started families at the time they were serving in the NHSC. Not surprisingly, these clinicians can face a number of family-related concerns. Some issues can include their spouses' employment situation and his/her adjustment to the community, their children's access to educational opportunities and general satisfaction in the community, as well as an overall feeling that the community provides a safe environment for their family.

Clinicians who report that their spouses are happy in the community as they serve are more likely to remain at their service sites at 2years and also at 10 years. A similar pattern was observed for those clinicians who believed that staying in the community was not likely to be a problem for their families. Short term retention was also associated with more positive perceptions of the community as a safe place to live. Concerns about children's educational opportunities and community satisfaction as well as about spouses' employment opportunities were related to retention at the same site and retention in any underserved community at 2 years, but by ten years out these concerns were no longer related to retention. None of these family related factors were related to retention in practices that focused on the underserved in the long term. This is not surprising, as family situations are likely to change over the course of a decade, and the questions about families' community integration focused on the specific community where the NHSC site was located and would not necessarily reflect family's successes with the communities where clinicians work subsequently.

3. How important to retention is the sense of being supported by the NHSC? What role does customer service play in NHSC program structure/organization regarding retention?

Among this study's 2005 alumni, those who retrospectively provided higher satisfaction ratings with the contact and support they received from NHSC staff were more likely to have remained 2 years in their service sites and also more likely to have remained 2 years within practices that focus on underserved care (**Table 14**). Similarly, feeling appreciated by NHSC staff and being overall more satisfied with the NHSC experience were also associated with higher likelihood of retention in service sites and in underserved-focused practices at 2 years (**Tables 15 and 16**). Further, the more that

clinicians felt the NHSC experience exceeded their expectations the more likely they were to be retained both in their service sites and in underserved-focused sites at 2 years (**Table 17**). In terms of magnitude of effect, clinicians who provided the highest ratings for their satisfaction with NHSC staff contact, feeling appreciated by NHSC staff, satisfaction with the NHSC program and for how well the NHSC program met their expectations were about twice as likely still to be working in their NHSC service sites two years after their contracts were fulfilled than clinicians who provided the lowest ratings on each measure.

These data suggest that clinicians' interactions with the NHSC and their perceptions of the NHSC program experience are important to their retention. However, the data are not specific in pointing to exactly what about their interactions with NHSC staff and what about their NHSC experiences affect retention. It is reasonable to assume that the issues important to retention and needing to be remedied are among those identified in the NHSC's recent, fact finding "town-hall meetings" held across the country and through its customer service surveys of the past two years. The issues identified—a bureaucratic feel to the program, clinicians' difficulties getting their questions answered, a cumbersome application process, inflexibility in addressing clinicians' individual needs as they arise—seem like the kinds of issues that are off-putting for young clinicians and can harm quick resolutions to problems when they are small and haven't yet grown to where they affect clinicians' willingness to remain at their service sites.

RECOMMENDATIONS

The following recommendations are offered for ways to maximize retention of NHSC clinicians. They follow from the findings of this study, especially as they are confirmed by the strongest previous studies of retention among NHSC alumni.

1. **The NHSC should continue to emphasize the Loan Repayment Program over the Scholarship Program in the proportion of program funds allocated and number of awards made.** Continuing to emphasize the Loan Repayment Program is the single most important choice the NHSC can make to foster retention among its alumni.

2. **The fit between NHSC clinicians and the sites where they serve should be maximized. Site-clinician fit can be maximized by:**

    a. ***preferentially awarding Loan Repayment contracts to clinician applicants who seem best matched to the NHSC-eligible sites where they ask to serve.*** This can be clinicians who are currently working or proposing to work/serve in a state where they grew up or trained, and in a specific practice and community that offer the features they indicated they wanted on the program application form. Similarly, sites should indicate up-front the type of clinician they prefer (e.g., discipline, background, special skills and interests) and preference given to matches where the site's preferences are met.

    b. ***guaranteeing that there is always a minimum of three, and preferably five or more sites available each year for the number of Scholars from each discipline who are completing their training and will be looking for service sites that year.*** Offering fewer sites from which to select makes it more likely that Scholars will not find a well-suited site and therefore, will not likely remain after their NHSC contract periods.

    c. ***understanding that although the NHSC is a national program in its design and reach, for its clinicians it functions as a state and even local program.*** For a pediatrician looking for loan repayment support for work in a community health center in a town of less than 20,000 population, making loan repayment available in a site like this in Florida is unlikely to yield a good fit if the pediatrician's background, extended family and location preferences are in Idaho. A broad range of types of service-eligible sites should be available in every state, to better fit interested clinicians from that state or region.

    d. ***allowing and assisting clinicians in service to relocate to sites that better fit theirs and their families' changing needs.*** Remaining in an ill-fitting practice very likely means clinicians will leave that NHSC practice as soon as their contract is fulfilled. Allowing clinicians to relocate to another NHSC site gives them another opportunity to find a good

match and remain longer term in a site approved by the NHSC.

e. ***providing assistance to the often inexperienced clinicians as they apply for NHSC loan repayment in how to find a well-fitting site.*** Assistance can be provided through on-line resources like a source guide ("Choosing a well-suited practice"), guidance from NHSC alumni and regional office staff prior to formally applying for loan repayment with the site identified, and developing curriculum models appropriate for each of the NHSC's participating disciplines that can be offered to training programs.

3. **The NHSC should explore the possibility—the expected outcomes, acceptability, feasibility—of preferentially awarding Loan Repayment and/or Scholarship awards to older and married clinicians, who are at a more stable phase of their lives and tend to remain in their service sites longer than younger and unmarried clinician*s.***

4. **NHSC awards should be preferentially made to clinicians who are committed to the NHSC's mission of providing care to underserved populations.** Evidence from this study suggests that these service-minded individuals are more likely to remain working in practices focused on care for the underserved, although they are no more or less likely to remain in their NHSC service sites specifically. Applicants' service orientation can be judged based on their resumes, a personal statement and/or interviews.

5. **The NHSC should continue its current, very much on-target efforts to remedy the issues about serving in the NHSC that its clinicians have identified through town-hall meetings and customer surveys.** Improved retention will be an important dividend of successes with current initiatives to augment staff training, improve systems of phone and electronic communications with clinicians, simplify the steps of the application and renewal application processes, have regional staff visit NHSC clinicians in the field to build relationships and help clinicians overcome any local problems early on, and help NHSC clinicians link with and support one another to build a sense of community and pride in being part of the NHSC.

6. **The retention implications of all of the NHSC's central policies should be well understood and regularly included among the factors considered when setting policies*.*** Understanding retention implications of some key policies will require additional, focused in-depth analyses of the data from the current study and/or from other past and future studies. ***Analyses should be carried out to inform the NHSC on the retention implications of:***

a. ***the range of disciplines deemed eligible for NHSC awards and any special support needed for clinicians of the various disciplines*.** The Scholarship and/or Loan Repayment Program models would be expected to yield better retention among some disciplines than others: longer term impact of the NHSC can be enhanced by focusing awards on the disciplines with the longest retention. Further, unique factors will be found to affect the retention of specific disciplines, and once identified these factors can be targeted through interventions. For example, if retention for physician assistants or nurse practitioners is found to be affected by the quality of the relationship with supervising physicians, which unfortunately too often can be non-supportive, then this can be targeted in staff development interventions at NHSC sites as well as requiring sites to provide sufficient time to physicians to carry out their supervisory functions, a frustration for many supervising physicians.

b. ***the range of types of sites eligible to participate in the NHSC.*** If retention is problematic in some types of sites, this should be known and the reasons understood. This will allow the NHSC to (a) limit future placements in these types of sites, (b) target future awards to just selected practices of these types, specifically the ones that can demonstrate they do not suffer from the issues that affect retention for their type of site as a whole, and/or (c) design targeted interventions to help these sites improve retention for NHSC clinicians. Given this study's findings, retention issues for community health centers deserve particular attention through further analyses.

c. ***whether making awards to clinicians who have not yet located to their proposed service sites, or to those who began working in their proposed service sites within the previous six or twelve months versus to those who have already worked in their proposed service sites for over twelve months.*** For clinicians who are already working in their service sites, a loan repayment award will principally be a retention incentive; for those not yet working in service sites, a loan repayment award can work as both a recruitment and retention incentive. It should be known if loan repayment works as a better retention incentive for those who are already working in their service sites or for those not yet working there. Knowing this may be useful to setting the balance of awards made to these two groups (or to the middle group, many of whom are aware of the possibility of qualifying for loan repayment at their site when deciding to work there).

d. ***loan repayment award amounts for the various disciplines.*** If the amount of loan repayment support that clinicians of the various disciplines receive, perhaps examined relative to debt levels, does not appear to affect retention duration, then amounts could be lowered, freeing program dollars to make more loan repayment awards. Award levels could be set based on other considerations, such as the amount needed to entice the targeted number of clinicians of each discipline into the NHSC program.

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APPENDICES

APPENDIX I. ANTICIPATION OF CONTINUED SERVICE AMONG 2010 CURRENT NHSC CLINICIANS

A total of 1,721 clinicians serving in the NHSC as of September 1, 2010 responded to the "Current Clinician Survey" in the summer and fall of 2011. In the survey, they reported how many more years they expected to remain in their current practices, which for most were still their NHSC service sites, and how many more years they expected to "continue practicing with a medically underserved population."

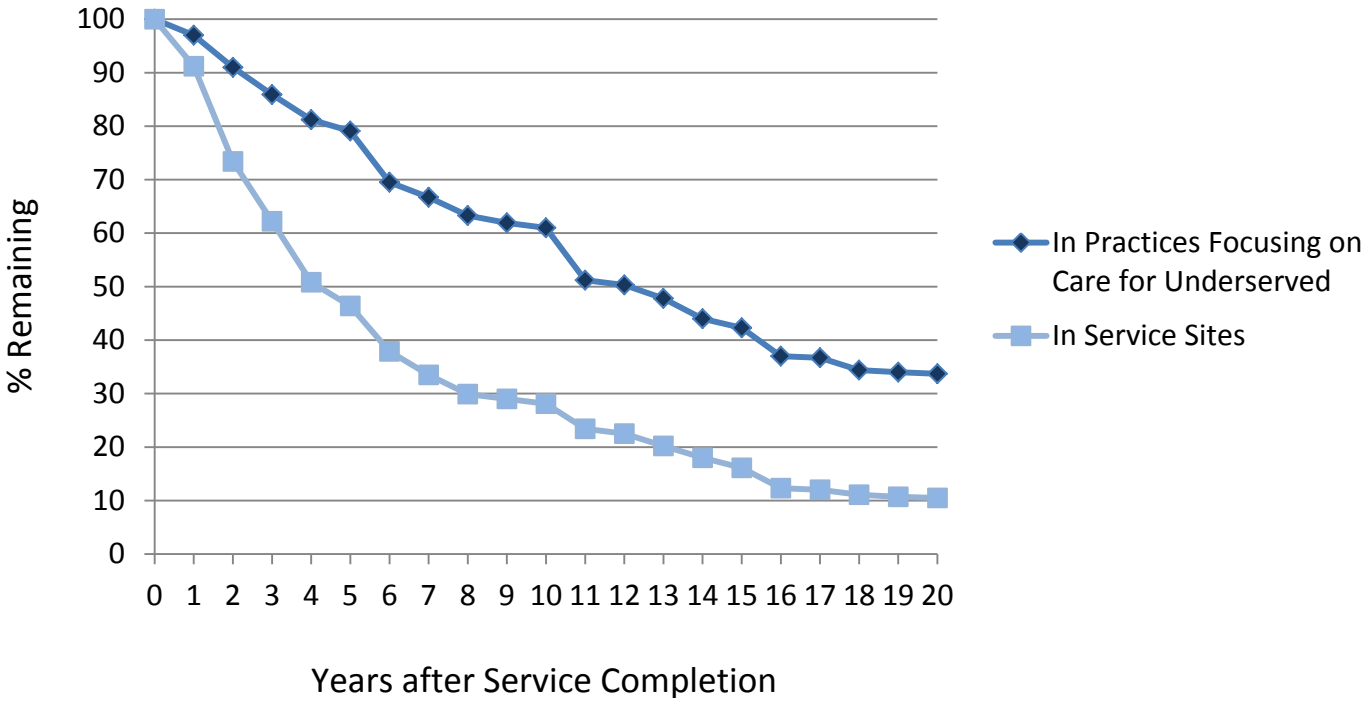
Current Loan Repayors. Of the 1,456 Current NHSC Loan Repayment Program respondents, 9 out of 10 had started their NHSC service within the 3 years preceding the 2011 survey and 12.8% had already completed their NHSC service. More than one-third (37.9%) reported that they had or were planning to apply for a Loan Repayment continuation/renewal contract and another 12.8% thought they might do so.

Among the 87.2% of Current NHSC Loan Repayors who were still serving in the NHSC when surveyed, 73.4% expected to still be working in their current service sites in another two years, 46.4% in five years, 28.1% in ten years, 16.1% in 15 years and 10.5% in 20 years (**Appendix 1. Figure 1.**). Among these same Current Loan Repayors who were still serving in the NHSC, 91.0% anticipated that they would be working in a practice focused on care for the underserved in two years, 79.1% in five years, 61.0% in 10 years, 42.3% in 15 years and 33.7% in 20 years.

Current Scholars. Among the 265 Current NHSC Scholar respondents, more than 9 out of 10 had started their NHSC service within the 4 years preceding the 2011 survey and 29.1%% had already completed their NHSC service. Half (49.6%) reported that they were considering or had already signed a NHSC contract continuation/extension.

Among the 70.9% of Current NHSC Scholars who were still serving in the NHSC when surveyed, 70.6% expected to still be working in their current service sites in another two years, 30.7% in five years, 12.9% in ten years, 8.6% in 15 years and 3.1% in 20 years (**Appendix 1. Figure 2.**). Among these same Current Scholars who were still serving in the NHSC, 89.2% anticipated that they would be working in a practice focused on care for the underserved in two years, 74.3% in five years, 61.5% in 10 years, 42.6% in 15 years and 33.1% in 20 years.

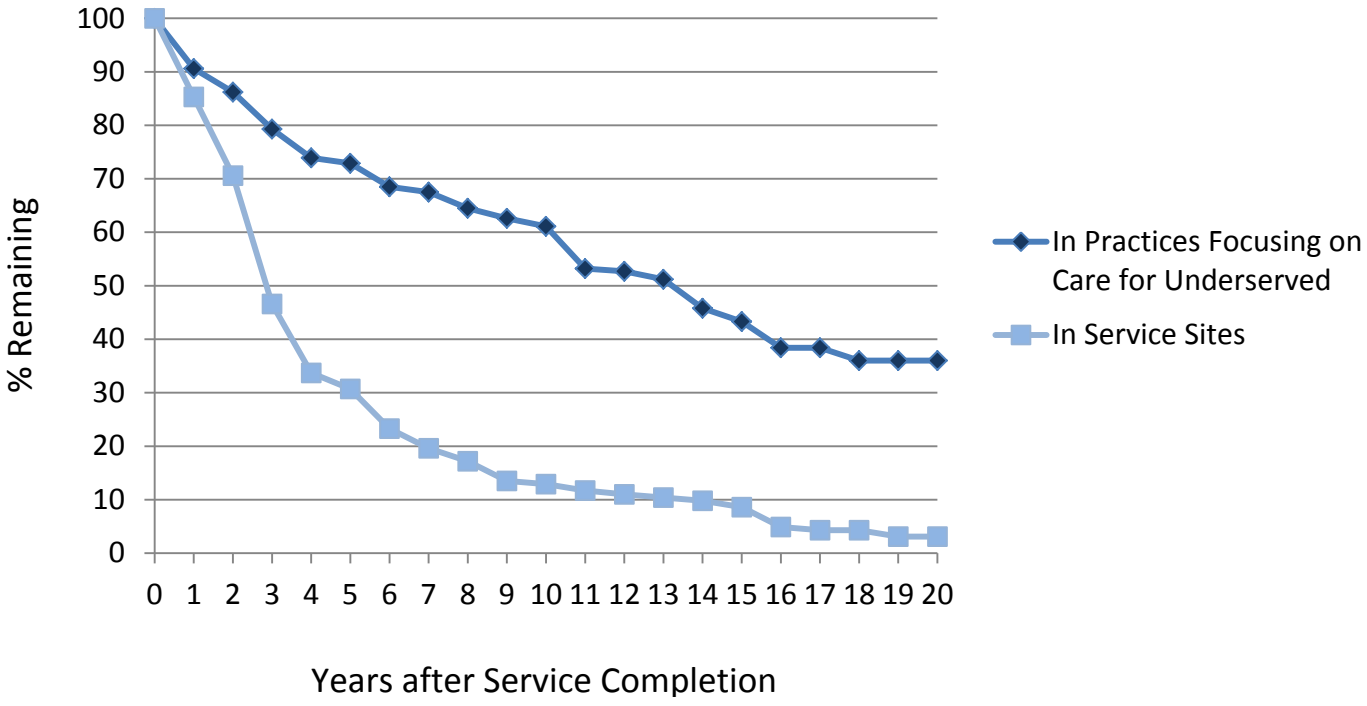
Figure 12: Appendix I. Figure 1. Anticipated Retention for 2010 Current NHSC Loan Repayors



Data for Appendix I. Figure 1. Anticipated Retention for 2010 Current NHSC Loan Repayors within Their Service Sites and Practicing with Medically Underserved Populations

	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	10 yrs	15 yrs	20 yrs
In service sites	91.2%	73.4%	62.2%	50.8%	46.4%	28.1%	16.1%	10.5%
In Underserved-Focused Practices	97.0%	91.0%	85.9%	81.2%	79.1%	61.0%	42.3%	33.7%

Figure 13: Appendix I. Figure 2. Anticipated Retention for 2010 Current NHSC Scholars



Data for Appendix I. Figure 2. Anticipated Retention for 2010 Current NHSC Scholars within Their Service Sites and Practicing with Medically Underserved Populations

	1 yr	2 yrs	3 yrs	4 yrs	5 yrs	10 yrs	15 yrs	20 yrs
In service sites	85.3%	70.6%	46.6%	33.7%	30.7%	12.9%	8.6%	3.1%
In Underserved-Focused Practices	92.6%	89.2%	79.7%	75.0%	74.3%	61.5%	42.6%	33.1%

APPENDIX II. RESPONSES TO RETENTION-RELEVANT QUESTIONNAIRE ITEMS FROM THE NHSC SITE ADMINISTRATORS' SURVEY

NHSC site administrators and personnel directors can provide an important perspective on how NHSC clinicians fit in and perform in their responsibilities in the organizations where they serve, and provide a "from-the-field" perspective on the factors that influence retention. As part of this long term retention evaluation, from the BMISS file we randomly selected 500 de-duplicated principal contacts for sites where NHSC clinicians were serving September 1, 2010 according to file information. Site contacts were individuals specified by the organizations to handle communications with the NHSC and were typically site administrators or personnel directors. The identity and email address for the selected sites were confirmed through information on the NHSC's website listing of designated sites and through calls to practices. These contacts were recruited by email to complete an on-line questionnaire about their organization's experiences with both current and past NHSC clinicians. Two follow-up reminder requests were sent.

Below are the response percentages and mean values for three banks of Likert-scaled questions addressing retention-relevant issues. There are 194 eligible respondents to this survey.

9. How much do you agree or disagree with the following statements about the compensation of your current and recent NHSC clinician(s)?
***(check one response for each statement)* ***

	Strongly Agree		Neutral		Strongly Disagree	
	1	2	3	4	5	Mean
a. Our NHSC clinician(s) are paid somewhat less than their non-NHSC peers in our organization with the same experience and training.	3%	4%	5%	5%	83%	4.6
b. Our NHSC clinicians are generally just as satisfied with their salary levels and benefit packages as their non-NHSC clinical peers in our organization.	62%	15%	10%	4%	9%	1.8
c. NHSC clinicians require a higher salary to be retained (after their NHSC service contract is over) than non-NHSC clinical peers in our organization.	6%	4%	18%	20%	51%	4.1

* Percentage figures may not total 100% due to rounding

10. Based on your experience as an administrator, please rate how NHSC clinicians at your organization have compared with non-NHSC clinicians on the following attributes: *(check one response for each statement)* *

	NHSC clinicians do much better		NHSC & non-NHSC are same		NHSC clinicians do much worse	
	+2	+1	0	-1	-2	Mean
a. Overall fit with the organization	7%	25%	67%	2%	--	0.36
b. Concordance with the organizational mission	9%	24%	65%	2%	--	0.40
c. Breadth of skills	6%	13%	80%	1%	--	0.24
d. Quality of care provided by clinician	7%	12%	81%	--	--	0.26
e. Quality of interaction with clinician staff	7%	14%	79%	--	1%	0.26
f. Quality of interaction with support staff	4%	17%	78%	1%	1%	0.23
g. Quality of interaction with health and social service providers outside our organization	6%	15%	80%	--	--	0.26
h. Willingness to carry their own weight	7%	15%	74%	4%	--	0.25
i. Willingness to be flexible in terms of scheduling	5%	16%	72%	7%	1%	0.16
j. Willingness to help the organization when called upon	9%	14%	73%	3%	1%	0.25
k. Cultural competence/sensitivity	5%	20%	73%	2%	--	0.29
l. Ability to speak with non-English speaking patients	3%	11%	82%	3%	1%	0.13
m. Their satisfaction with work at this setting	7%	21%	69%	4%	--	0.30
n. Integration into the life of the local community	6%	10%	76%	7%	1%	0.13
o. Integration of family into local community	6%	9%	76%	6%	2%	0.12
p. Retention for 5 or more years	6%	14%	55%	16%	10%	-.09

* Percentage figures may not total 100% due to rounding

11. How much do you agree or disagree with the following statements about retention of NHSC clinicians in your organization beyond their NHSC service commitment term? *(check one number on each line)* * **

	Strongly Agree		Neutral		Strongly Disagree	
	1	2	3	4	5	Mean
a. On average, recruiting non-NHSC clinicians is easier than recruiting NHSC clinicians	7%	18%	36%	22%	18%	3.27
b. The availability of locum tenens is a key factor in the retention of NHSC clinicians at our organization	--	6%	29%	14%	52%	4.13
c. It is easier to retain NHSC loan repayors than NHSC scholars at our organization	16%	27%	41%	11%	5%	2.61
d. Retention of NHSC physicians is more of a problem for our organization than retention of non-NHSC physicians	4%	15%	35%	22%	24%	3.47
e. Retention of PAs, NPs and midwives who are in the NHSC is more of a problem at our organization than retention of individuals not in the NHSC in these disciplines	2%	12%	40%	20%	26%	3.56
f. Retention of NHSC mental health practitioners (e.g., psychologists, clinical social workers) is more of a problem at our organization than retention of non-NHSC mental health clinicians	5%	10%	39%	25%	22%	3.49
g. Retention of NHSC dentists is more of a problem at our organization than retention of non-NHSC dentists	7%	7%	47%	22%	16%	3.32
h. From the very outset, when NHSC clinicians start working in our organization most already plan to leave after their service obligation is complete	7%	25%	23%	17%	28%	3.34
i. The management style at our clinic has had a positive impact on retention of NHSC clinicians beyond their obligation	15%	43%	34%	6%	2%	2.36
j. The use of a "recruitment" bonus at the end of the NHSC service period helps keep NHSC clinicians beyond the obligation	11%	15%	29%	21%	24%	3.33
k. Unsatisfactory adjustment of NHSC clinicians' families to our community is a problem for NHSC clinician retention	3%	18%	29%	17%	32%	3.57
l. Allowing NHSC clinicians to teach helps or could help keep them beyond their obligation	11%	34%	43%	7%	4%	2.59
m. If we could offer 25% higher salaries we would do much better retaining NHSC clinicians beyond their obligations	32%	26%	19%	8%	15%	2.49
n. There is not much that our organization can do to improve the retention of our NHSC clinicians	13%	18%	41%	22%	6%	2.89
o. NHSC clinicians in our organization have as much opportunity to teach if they want to as our non-NHSC clinicians	36%	34%	24%	2%	4%	2.06
p. Our organization's patients do not know which of our clinicians are serving in the NHSC	68%	21%	8%	2%	2%	1.50
q. Our organization's staff do not know which of our clinicians are serving in the NHSC	37%	31%	11%	9%	12%	2.28

	Strongly Agree		Neutral		Strongly Disagree	
	1	2	3	4	5	Mean
r. The NHSC national office could do more to help us retain our NHSC clinicians	12%	21%	46%	10%	12%	2.88
s. Our DHHS regional office could do more to help us retain our NHSC clinicians	11%	22%	44%	10%	13%	2.90
t. Our state Primary Care Organization could do more to help us retain our NHSC clinicians	12%	15%	46%	11%	15%	3.01

* Percentage figures may not total 100% due to rounding

** Respondents could check “don’t know” for situations where items address issues for which their organizations have no or too little experience to base responses, e.g., teaching or hiring certain disciplines. Percentages reflect only those who did not respond “don’t know”

APPENDIX III. SURVEY RESPONSE SUMMARIES FOR NHSC LOAN PAYERS AND SCHOLARS IN 2005 AND 2010 *

	2005 Alumni		2010 Current Clinicians	
	Loan Repay	**Scholars**	**Loan Repay**	**Scholars**
# Respondents	(n=499)	(n=120)	(n=1,456)	(n=265)
Clinician Demographics and Backgrounds				
Age (median)	35 years (in 2005)	34 years (in 2005)	35 years (in 2010)	34 years (in 2010)
Gender				
Female	65.6%	77.7%	71.9%	65.8%
Male	34.4%	22.3%	28.1%	34.2%
Community of Upbringing				
Urban	28.0%	18.8%	44.8%	18.2%
Suburban	32.4%	45.4%	31.6%	47.0%
Small town/rural	37.3%	34.1%	21.0%	33.2%
No principal place	2.3%	1.7%	2.6%	1.5%
Had formal training with underserved populations				
As a student	73.7%	82.2%	76.3%	83.0%
As a resident or fellow	39.7%	38.8%	25.9%	64.0%

None	18.4%	11.9%	19.4%	8.7%
# Weeks of underserved pop. training (median; among those w/ such training)	25.5 weeks	24.0 weeks	24.0 weeks	24.5 weeks
Participated in SEARCH Program	4.0%	14.6%	2.9%	22.0%
Educational $$ debt at end of training (median)	$100,000	$47,114	$100,000	$70,000

	2005 Alumni		2010 Current Clinicians	
	Loan Repay	**Scholars**	**Loan Repay**	**Scholars**
Experience Joining the NHSC and Selecting First NHSC Site				
# of years of student support (mean)	not applic.	2.50	not applic.	3.12
Factor importance rating in joining NHSC				
Needed the funding	30.7%	18.6%	29.3%	20.9%
Providing care to underserved	17.1%	33.1%	14.3%	41.5%
Both of equal importance	52.2%	48.4%	56.4%	47.5%
Rating of experience finding first NHSC site (% who agree**)				
# of NHSC-eligible sites was adequate	n.a.	24.3%	n.a.	21.9%
Able to find a NHSC site that met most professional needs	n.a.	65.1%	n.a.	62.3%
Site matching process provided enough time	n.a.	39.2%	n.a.	50.4%
Received enough assistance from NHSC and others in the site matching process	n.a.	25.6%	n.a.	27.9%
Was already working in the service site when applied to NHSC	78.8%	n.a.	89.6%	n.a.
Number of months already working in service site (median; among those already working in site when applied)	12 months	n.a.	9 months	n.a.

Clinician knew that site might be eligible for NHSC loan repayment when decided to work here (among those already working in site when applied)	54.2%	n.a.	57.8%	n.a.
Where clinicians felt they would have worked if they were not in NHSC				
In the same practice	63.8%	13.3%	68.8%	15.8%
In an underserved area	79.5%	36.3%	25.2%	46.0%
In a community or migrant health center	85.7%	23.4%	15.1%	28.3%

	2005 Alumni		2010 Current Clinicians	
	Loan Repay	**Scholars**	**Loan Repay**	**Scholars**
Experiences in First NHSC Site				
Type of practice				
Community/Migrant health center	40.0%	57.6%	42.1%	55.1%
Rural health clinic	16.3%	19.7%	17.6%	16.9%
Other primary care practice	3.3%	5.1%	3.9%	5.9%
Indian Health Service site	0.4%	5.1%	0.8%	4.7%
Tribal site	0.2%	1.8%	0.7%	0.8%
Prison	4.2%	4.3%	8.8%	4.3%
Health department	5.4%	0.6%	1.5%	1.2%
Dental practice	3.0%	0.0%	1.5%	0.8%
Mental health or substance abuse facility	15.9%	1.7%	14.6%	2.0%
Nursing home	0.0%	0.0%	0.1%	0.0%
University-based clinic or service	0.3%	0.0%	0.3%	0.4%
Hospital-based clinic or service	6.8%	2.7%	4.2%	4.3%
Other	4.2%	0.8%	4.1%	3.5%
Patient/Client encounters on typical day (mean)	17.9	20.5	17.3	21.5
Days/Evenings on-call per week (mean)	1.7	1.8	1.4	1.8
Teaches students	59.5%	56.9%	49.1%	60.4%

# half-days/month teaching (mean; among those who teach)	6.3 half days/mon	6.7 half days/mon	5.5 half days/mon	6.3 half days/mon

	2005 Alumni		2010 Current Clinicians	
	Loan Repay	**Scholars**	**Loan Repay**	**Scholars**
Satisfaction with various aspects of the site (% who are satisfied***)				
Relationship with administrator	49.2%	44.9%	60.4%	44.6%
Financial stability of site	55.2%	53.0%	56.1%	49.4%
Physical condition of site	60.8%	61.1%	64.6%	57.4%
Salary or income	52.4%	52.2%	53.7%	54.1%
Availability of cross coverage	65.5%	66.4%	68.4%	63.8%
Mission/Goals of the practice	76.4%	80.5%	80.1%	71.0%
Access to specialists	50.3%	48.1%	57.0%	46.2%
Support from other clinicians at site	71.7%	59.5%	78.2%	62.2%
Contacts and other support received from NHSC staff	40.1%	17.8%	not asked	not asked
Rating of work in first NHSC site (% who agree**)				
Had good clinical back-up from senior and/or supervising clinicians	59.9%	51.7%	66.3%	47.0%
Able to provide full range of services	84.2%	72.2%	81.4%	58.0%
Practice had effective administrator	48.2%	40.7%	60.2%	41.6%
Work rarely encroached on personal time	37.3%	33.0%	38.4%	35.2%

Felt strong connection to patients	87.4%	87.0%	83.8%	79.2%
Felt they were doing important work	96.1%	88.4%	93.6%	87.5%
Felt a sense of belonging to the community	73.9%	66.7%	74.6%	62.4%
Felt appreciated by NHSC staff	45.4%	20.1%	- - -	- - -
Overall, was pleased with their work	89.6%	76.8%	87.3%	72.3%
Overall, was satisfied with their practice	77.4%	59.6%	75.3%	53.0%

	2005 Alumni		2010 Current Clinicians	
	Loan Repay	**Scholars**	**Loan Repay**	**Scholars**
Family and Family Experience				
Married or had partner	77.0%	74.0%	79.6%	79.5%
Type of community where spouse/partner was raised (among those w/ spouse or partner)				
Urban	29.0%	34.8%	46.2%	19.7%
Suburban	27.5%	36.7%	30.1%	38.3%
Small town or rural	41.9%	26.1%	22.3%	39.4%
No one or principal place	1.2%	2.4%	1.4%	2.6%
Ratings ** of family experience in community (among those who are married or with children)				
Spouse happy in community	49.4%	36.0%	54.9%	37.3%
There were satisfaction professional opportunities for spouse	38.9%	35.7%	43.1%	31.2%
Children were happy in community	38.5%	28.1%	43.1%	39.5%
There were satisfactory educational opportunities for children	31.3%	23.0%	38.3%	30.1%
Family was concerned for personal safety	18.0%	25.2%	26.8%	18.0%
Overall Rating of NHSC Experience				

Overall satisfaction with the NHSC (mean rating from 0 (very dissat) to 10 (very satisfied))	8.48	6.73	- - -	- - -
NHSC experience exceeded or fell short of expectations (mean rating from 0 (fell well short) to 10 (far exceeded))	6.86	5.01	- - -	- - -

* based on survey data weighted for sampling probabilities and subgroup response rates

** % responding that they “agree” or “strongly agree” vs. “neither agree nor disagree”, “disagree” or “strongly disagree”

*** % responding that they were “Satisfied” or “Very Satisfied” vs. “Neutral”, “Dissatisfied” or “Very Dissatisfied”

APPENDIX IV. DETAILS OF SELECTED STUDY METHODS

A. Sampling Strategies for the NHSC Retention Study

Background

The overall purpose of the study was to measure levels of retention of NHSC clinicians to gain a better understanding of the factors affecting retention. This was to be done by examining the retention behavior of previous cohorts of clinicians, as well as the retention expectations of current clinicians and the perceptions of retention among site managers. Consequently different surveys were designed for four distinct populations. These are:

- Current Clinicians: clinicians of all disciplines who were serving (providing clinical work) in the NHSC on September 1, 2010
- Recent Clinician Alumni: clinicians of all disciplines who were serving (providing clinical work) in the NHSC on September 1, 2005, augmented for disciplines with small numbers with clinicians serving on September 1, 2006.
- Remote Clinician Alumni: clinicians of all disciplines who were serving (providing clinical work) in NHSC on December 31, 1997 and responded to the 1998 NHSC National Evaluation survey conducted by the University of North Carolina and Mathematica Policy Research.
- Current Administrators: Administrators of organizations staffed by NHSC clinicians on September 1, 2010.

In addition to overall estimates of retention, the study's other key task was to perform comparative estimates of retention by type of program, across different health professions, and by type of community.

Given the time frame as well as feasibility and resource constraints, the research team estimated that a total of as many as 7,500 clinicians and administrators would have to be selected for all 4 surveys—such samples likely would be large enough to permit stable analyses of important subgroups but not so large as to be unwieldy in surveying efforts. The use of sampling was also required by the technical consultant who reviewed this project's proposal for HRSA. Assuming that typically 60% response rates could be obtained from most samples, the total number of respondents from the various samples was anticipated to be in the range of 4,500. Given the basic questions to be asked of site administrators and the simple frequencies to be reported, questionnaires were planned for only 500 administrators. Questionnaires were also to be sent to all 857 respondents from the then "current clinician" cohort of the 1998 survey. The remaining number-- a total of 6,143 clinicians--were to targeted for the 2010 clinicians and 2005/2006 clinicians.

Sampling Frames

Sampling frames for three of the four surveys use the BCRS Management Information System Solution ("BMISS") data. BMISS includes information on current and past (back to 2000) National Health Service Corps (NHSC) participants and service sites. The fourth survey used the project records and databases from the earlier, 1998 survey of NHSC clinicians as part of the National Evaluation of the NHSC and who were located and re-contacted using a variety of sources. Inspection of the BMISS files enumerated 6,257 clinicians on the 2010 sampling frame and 3,552 clinicians on the 2005/2006 sampling frame. A simple random sampling approach was applied to the selection of administrators, since results were to be reported for NHSC sites overall and not by specific types of sites for which oversampling would be needed with smaller groups. Five-hundred administrators were randomly sampled.

Complex survey sampling designs were required for the Current Clinicians (2010) and the 2005/6 Recent Alumni cohorts, discussed in more detail below.

Sampling Design Considerations

The unit of analysis was the individual NHSC clinician. Three types of variables of policy interest to the NHSC were used in setting up strata for the sample. These variables were:

Program Type (Scholarship or Loan repayment) defined as the program the clinician was participating in at the specific time during which they were sampled.

Community Type of Service Location (i.e., Urban, Rural, or Frontier). This is the type of county in which the service is being performed.

Clinician Discipline and Specialty. This is a combination of discipline (e.g., physician, nurse practitioner, clinical psychologist, dental hygienist) and, for physicians only, further break down by specialty (e.g., family medicine, pediatrics, internal medicine, psychiatry, obstetrics/gynecology)

To assure that each final sample represented a highly diverse cross-section of the target population and that these samples would provide adequate representation of all clinicians participating in NHSC, we initially divided all clinicians on the files into sampling strata defined jointly by program type (Scholarship or Loan Repayment), location of their NHSC site (i.e., urban, rural, or frontier), and 12 to 16 combinations of clinical discipline and specialty. Physicians with MD and DO degrees were combined and treated the same in all sampling. Physicians of the various specialties were treated as partially distinct groups in sampling. Health professions that were only represented in NHSC demonstrations (i.e., pharmacists and chiropractors) were only found on the 2005/6 file were grouped together.

Three primary considerations were involved in constructing maximally efficient sampling designs for the 2005/6 and 2010 cohorts: (1) assuring that the primary outcome to be assessed, i.e., clinician retention, could be estimated with reasonable accuracy; (2) assuring that there would be sufficient numbers in each of the various policy relevant subgroups of clinicians so that comparative estimates of retention could be made with some precision; and (3) assuring that both 2005/6 and 2010 groups produce estimates of approximately the same statistical precision. Power calculations indicate that the number of respondents in groups should be at least 133 to permit analyses to detect a 15% difference in

retention between groups (e.g., between disciplines, rural vs. urban setting). Assuming an approximate 60% response rate, a desirable cell size would be around 220 to achieve a power of .80. Further, separate estimates were desired for urban and rural clinicians within a discipline/specialty group. (Frontier clinicians were dealt with separately; see below.) However, given that typically larger (but varying) numbers of clinicians were located in urban sites than in rural sites, we chose to allocate the distribution of the 220 clinician threshold on a 55% to 45% basis, respectively to maximize precision of overall estimates. On this basis, the design required selecting for survey every individual in an urban cell where there were 121 or fewer cases and selecting every individual in a rural cell where there were 99 or fewer cases. Because comparable precision was expected from the current and recent alumni samples, we expected that in the aggregate the two samples would be roughly the same size.

Execution of the Samples

Using the procedures outlined above, it was evident that the small numbers of clinicians in the Scholarship Program in 2010 (N=536) and in 2005/6 (N=435) would require that all would be surveyed. Sampling was used only among the Loan Repayment groups. Further, estimates for all three types of communities—urban, rural, frontier—were of interest to HRSA but the numbers of clinicians in frontier counties were small in both the 2010 Current clinician group (N= 264) and 2005/6 Recent Alumni group (N= 150). Therefore, all clinicians in frontier counties were surveyed. As a result of these decisions, stratified sampling was only required for the non-frontier Loan Repayment subgroups within the 2005/6 Recent Alumni and 2010 Current Clinician groups, using the design outlined above.

Current Clinician Sample.

Appendix IV. Table 1. displays the design and execution of the 2010 Current Clinician sample. The first row displays the number of cases in the frontier counties (N=264) and indicates that all clinicians in the Loan Repayment Program serving these counties were surveyed. Column 1 presents the number of cases on the sampling frame and column 2 displays the number of cases originally selected for survey according to the criteria presented above. Column 3 displays how we combined adjacent small cells to produce more stable estimates. The numbers in column 3 represent the clinicians who were actually selected for survey. Column 4 reports the number of valid responses received to the survey within each of the collapsed cells, while column 5 reflects the number of cases in the frame for each of the collapsed cells. Column 6 (Up Weight) is the number in column 5 divided by the number in column 4 which reflects the responses weighted up to the appropriate number of cases in the sampling frame, i.e., N=5721. Similarly column 7 (Down Weight) is the quantity in column 6 rescaled to reflect the actual size of the sample of respondents (n= 1,456).

Table 20: Appendix IV. Table 1: Design and execution of the 2010 Current Clinician Loan Repayor Sample

	2010 Sample	[1] N_h	[2] n_h	[3] n_h	[4] r_h	[5] N_h	[6] $UW = N_h/r_h$	[7] DW=UW* ($\Sigma nh/SNh$)
	Loan Repayors	Frame	Original Stratum	Selections Attempted	Revised Valid Responses	Revised Frame	Final Up Weight	Final Down Weight
Frontier	ALL disciplines and specialties	264	264	264	135	264	1.95556	0.49769
Urban	PHYSICIAN: Family Practice	467	121	121	56	467	8.33929	2.12236
Rural	PHYSICIAN: Family Practice	224	99	99	42	224	5.33333	1.35734
Urban	PHYSICIAN: Internist	87	87	109	52	109	2.09615	0.53347
Rural	PHYSICIAN: Internist	22	22					
Urban	PHYSICIAN: Pediatrics	167	167	201	102	201	1.97059	0.50152
Rural	PHYSICIAN: Pediatrics	34	34					
Urban	PHYSICIAN: OB/GYN	69	69	93	42	93	2.21429	0.56354
Rural	PHYSICIAN: OB/GYN	24	24					
Urban	PHYSICIAN: Psychiatry	60	60	82	42	82	1.95238	0.49688
Rural	PHYSICIAN: Psychiatry	22	22					
Urban	NURSE PRACTITIONER	564	121	121	73	564	7.72603	1.96628
Rural	NURSE PRACTITIONER	309	99	99	47	309	6.57447	1.67321
Urban	PHYSICIAN ASSISTANT	515	121	121	61	515	8.44262	2.14866
Rural	PHYSICIAN ASSISTANT	286	99	99	52	286	5.50000	1.39976
Urban	NURSE MIDWIFE	136	136	159	82	159	1.93902	0.49348
Rural	NURSE MIDWIFE	23	23					

Appendix IV. Table 1. (Cont): Design and execution of the 2010 Current Clinician Loan Repayor Sample

	2010 Sample	[1] N_h	[2] n_h	[3] n_h	[4] r_h	[5] N_h	[6] $UW = N_h/r_h$	[7] DW=UW* ($\Sigma nh/SNh$)
	Loan Repayors	Frame Count	Selected Sample Size	Selections Attempted	*Valid Responses*	Cases in Frame	Final Up Weight	Final Down Weight
Urban	DENTIST	444	121	121	*67*	444	6.62687	1.68654
Rural	DENTIST	166	99	99	*51*	166	3.25490	0.82838
Urban	DENTAL HYGIENIST	83	83	124	*54*	124	2.29630	0.58441
Rural	DENTAL HYGIENIST	41	41					
Urban	PSYCH NURSE PRACTITIONER	51	51	100	*57*	100	1.75439	0.44649
Rural	PSYCH NURSE PRACTITIONER	35	35					
Urban	PSYCH NURSE SPECIALIST	8	8					
Rural	PSYCH NURSE SPECIALIST	6	6					
Urban	MARRIAGE & FAMILY THERAPIST	48	48	68	*47*	68	1.44681	0.36821
Rural	MARRIAGE & FAMILY THERAPIST	20	20					
Urban	CLINICAL PSYCHOLOGIST	449	121	121	*75*	449	5.98667	1.52361
Rural	CLINICAL PSYCHOLOGIST	160	99	99	*56*	160	2.85714	0.72715
Urban	LICENSED PROF CONSELOR	239	121	121	*75*	239	3.18667	0.81101
Rural	LICENSED PROF CONSELOR	217	99	99	*62*	217	3.50000	0.89075
Urban	SOCIAL WORKER	283	121	121	*68*	283	4.16176	1.05917
Rural	SOCIAL WORKER	198	99	99	*58*	198	3.41379	0.86881
	SUBTOTAL non-Frontier LRPs	5,457	2,476	2,740	*1,456*	5,721		
	ALL LOAN REPAYERS	5.721						

Recent Alumni Clinician Sample.

Appendix IV. Table 2. displays the design and execution of the 2005/6 Recent Alumni clinician sample. The first row displays the number of cases in the frontier counties (N=150) and reports that all clinicians in the Loan Repayment Program serving these counties were surveyed. Columns 1 presents the number of cases in the sampling frame and column 2 displays the number of cases originally selected for survey according to the criteria presented above. Column 3 displays how we combined adjacent small cells in order to produce larger groups with more stable estimates. The numbers in column 3 represent the clinicians who were actually selected for survey. Column 4 reports the number of valid responses received to the survey within each of the collapsed cells, while column 5 reflects the number of cases in the frame for each of the collapsed cells. Column 6 (Up Weight) is the number in column 5 divided by the number in column 4 which reflects the responses weighted up to the appropriate number of cases in the sampling frame, i.e., N=3,106 Similarly column 7 (Down Weight) is the quantity in column 6 rescaled to reflect the actual size of the sample of respondents (n= 499 respondents).

Table 21: Appendix IV. Table 2. Design and Execution of the 2005/6 Recent NHSC Alumni Sample of Clinicians.

STRATUM NAME	U/R	Discipline/specialty	[1] Frame Count	[2] Selected Sample Size	[3] Selections Attempted	[4] Valid Responses	[5] Revised frame	[6] Final Up Weight	[7] Final Down Weights
22	F	Frontier Clinicians	150	150	150	35	150	4.1667	0.69
1	U	FAMILY PRACTICE	359	121	121	33	359	10.8788	1.75
2	R	FAMILY PRACTICE	198	99	99	17	198	11.6471	1.83
3	U	INTERNIST	118	118	157	29	157	5.4138	.87
	R	INTERNIST	39	39					
4	U	PEDIATRICS	156	121	153	47	188	4.0000	.64
	R	PEDIATRICS	32	32					
5	U	OB/GYN	94	94	191	36	191	5.3056	.85
	U	PSYCHIATRY	46	46					
	R	OB/GYN	19	19					
	R	PSYCHIATRY	32	32					
6	U	DENTIST	240	121	121	18	240	13.3333	2.14
7	R	DENTIST	94	94	94	13	94	7.2308	1.21
8	U	DENTAL HYGIENIST	35	35	50	4	50	12.5000	2.08
	R	DENTAL HYGIENIST	15	15					
9	U	PHYSICIAN ASSISTANT	191	121	121	29	191	6.5862	1.06
10	R	PHYSICIAN ASSISTANT	115	99	115	20	115	5.7500	.92
11	U	NURSE PRACTITIONER	176	121	121	24	176	7.3333	1.18
12	R	NURSE PRACTITIONER	83	83	83	12	83	6.9167	1.11
13	U	NURSE MIDWIFE	64	64	84	20	84	4.2000	0.70
	R	NURSE MIDWIFE	20	20					

Appendix IV. Table 2 (cont). Design and Execution of the 2005/6 Recent NHSC Alumni Sample of Clinicians.

STRATUM NAME	U/R	Discipline/specialty	[1] Frame Count	[2] Selected Sample Size	[3] Selections Attempted	[4] Valid Responses	[5] Revised frame	[6] Final Up Weight	[7] Final Down Weights
14	U	PSYCHIA NURSE PRACTITIONERS	16	16	44	6	44	7.3333	1.18
	U	PSYCHIATRIC NURSE SPECIALIST	5	5					
	R	PSYCHIA NURSE PRACTITIONERS	17	17					
	R	PSYCHIATRIC NURSE SPECIALIST	6	6					
15	U	SOCIAL WORKER	99	99	186	34	186	5.4706	.88
	R	SOCIAL WORKER	87	87					
16	U	CLINICAL PSYCHOLOGIST	181	121	121	43	181	4.2093	.68
17	R	CLINICAL PSYCHOLOGIST	137	99	99	26	137	5.2692	0.85
18	U	LIC PROF COUNSELOR	79	79	79	17	79	4.6471	0.75
19	R	LIC PROF COUNSELOR	128	99	99	18	128	7.1111	1.14
20	U	MARRIAGE AND FAMILY THERAPIST	21	21	39	7	39	5.5714	.90
	R	MARRIAGE AND FAMILY THERAPIST	18	18					
21	U	CHIROPRACTOR	9	9	36	11	36	3.2727	.53
	U	PHARMACIST	19	19					
	R	CHIROPRACTOR	4	4					
	R	PHARMACIST	4	4					
Total		Both U and R all professions	2,956			464	2,956		23.26
Grand Total		All clinicians in all types of communities	3,106			499			

Description of the Sampling Frame and Weighting Scheme for the 2011 Resurvey of the 1998 NHSC National Evaluation Respondent Group (i.e.," "Remote Alumni Clinicians")

The sampling frame for Remote Alumni clinicians consisted of all of the respondents to the National Evaluation Study conducted in 1998 by UNC and MPR for the NHSC. Understanding the design of the 2011 resurvey of these individuals requires some explanation of the original 1998 design. [See **Appendix IV. Table3.**] At that time (before the 2003 NHSC reauthorization legislation), only 5 professions were included in the NHSC—physicians (MD or DO), dentists, physician assistants, nurse practitioners, and certified nurse midwives. Most participants were physicians at that time and 4 physician subgroups were identified by the NHSC then of special interest: Urban Scholarship recipients, Urban Loan Repayors, Rural Scholarship recipients and Rural Loan Repayors. There were relatively few non-physicians in the Scholarship Program at that time (e.g., only 39 Scholarship dentists) so all clinicians of a given discipline were combined, regardless of programs and community location, into profession-specific strata. Further, given the small number of certified nurse midwives, this group was combined with nurse practitioners. The size of the entire NHSC 1998 cohort eligible for study was 1,418 clinicians.[See column 1]. The original survey employed a sampling design that required that only 1,143 eligible individuals were surveyed [See column 2] so that in some strata all individuals were targeted, while in others only a smaller random sample actually received surveys [See column 3]. At the conclusion of the 1998 study, 855 eligible individuals returned useable surveys. This entire group of 855 constituted the target "Remote Alumni" group for the 2011 survey [See Column 4]. .

For the 2011 survey, postal or email addresses were found for almost all of the individuals returning surveys in 1998, and 364, or about 43% of this original group were both located, contacted and yielded useable surveys. Results are displayed in columns 5 and 6. For analytical purposes, these individuals responding in 2011, were then weighted up to reflect original distribution of the 1,418 persons in the 1998 cross-sectional cohort and the weights are displayed in column 7 (Up Weights). Rescaled weights to reflect the 364 respondents in 2011 are displayed in column 8 (Down Weights). In general each individual in the 2011 sample represents as few as 3 to as many as 6 individuals in the original cohort of NHSC clinicians who were serving in 1998.

Table 22: Appendix IV. Table 3. Description of the Sampling Frame and Weighting Scheme for the 2011 Resurvey of the 1998 NHSC National Evaluation Respondent Group (i.e.," "Remote Alumni Clinicians")

Structure of Sampling Design				1998				2011			
				[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Stratum Number	Discipline	Program	Comm Type	Frame Numbers	Clinicians Targeted for Surveys	Ratio of Frame to Target	Eligible Clinicians with Useable Surveys	Eligible Clinicians with Useable Surveys	Response rate [5}/[4]	UpWeight [1]/[5]	Down Weight [7/[ratio]]
1	MD/DO	SCH	Urban	92	92	1.00	54	21	39%	4.3810	1.1246
2	MD/DO	LRP	Urban	240	154	1.56	104	42	40%	5.7143	1.4669
3	MD/DO	SCH	Rural	129	129	1.00	105	53	50%	2.4340	0.6248
4	MD/DO	LRP	Rural	306	172	1.78	124	58	47%	5.2759	1.3543
5	Dentists	ALL	ALL	192	137	1.40	106	51	48%	3.7647	0.9664
6	Physician Assistants	ALL	ALL	242	242	1.00	189	65	34%	3.7231	0.9557
7	Nurse Pract & CNMs	ALL	ALL	217	217	1.00	173	74	43%	2.9324	0.7528
ALL STRATA				1418	1143	1.24	855	364	43%		

Summary

Overall, the survey samples for this study will be adequate to achieve the objectives of the study. Although the response rates for all groups were less than hoped for, the data produced by the surveys are likely to yield estimates of retention and of other measures that have levels of precision adequate to guide policy for the NHSC. For example the current clinician surveys yielded response rates greater than 50 percent for most of the strata examined from both Scholars and Loan Repayors. These response rates are comparable or better to those reported in the peer reviewed literature for physician surveys. Individual strata response rates varied from 42% to 69%. On the other hand, results from the 2005/6 Recent Alumni group were especially disappointing given that the overall response rates for Scholars and Loan Repayors were less than 25%. The remote clinician survey yielded a response rate of 50 percent, which is strong considering that the initial data were collected from these individuals about 13 years ago and most have relocated since. Preliminary analyses using the extensive data from the 1998 survey were tested to assess whether or not certain characteristics of individuals in the remote alumni group were associated with non-response to the 2011 survey. No statistically significant associations between a variety of clinician characteristics and response to the recent survey could be detected. This pattern of response suggests that low response rates from NHSC alumni will not necessarily lead to systematically biased estimates, although they clearly limit the precision with which such estimates can be made.

B. Survey Procedures

Background

Four similar questionnaires were fielded with the 2010 Current Loan Repayors, 2010 Current Scholars, 2005 Recent Alumni Scholars and 2005 Recent Alumni Loan Repayors. Two other questionnaires were fielded with the 1998 Remote Alumni and Current Site Administrators. Surveys were administered over a period of approximately six months, beginning in August 2011 and continuing through January 2012. Surveys were conducted using mailed hardcopy questionnaires and on-line questionnaires with emailed invitations.

Survey Procedures

In preparation for the surveys, contact information was obtained, including e-mail and mailing addresses, and were verified and updated as follows:

- 2010 Current Clinician and 2005 Recent Alumni contact names and mail and e-mail addresses were obtained from the BCRS Management Information System Solution (BMISS).
- While it was assumed that address information for 2010 Current Clinicians would be up-to-date, contact information, including both mail and email addresses, for the 2005 Recent Alumni sample was confirmed/updated using the verification services of the commercial firm AlumniFinder (http://www.alumnifinder.com/). New email addresses were found for only a minority of individuals.
- The 1998 Remote Alumni addresses available from the archived 1998 survey data file were also confirmed and updated using AlumniFinder, as well as other databases, including the Centers for Medicare and Medicaid Services National Provider Identifier (NPI) and professional association web sites. Seemingly current mailing addresses were obtained for most but not all remote alumni.
- Site Administrator contact information (names, addresses, e-mail addresses and telephone numbers) were obtained from BMISS files. These were verified/updated through data on the NHSC website and telephone calls to sites.

Survey invitations were e-mailed to the 2010 Current Clinicians, 2005 Recent Clinicians and Current Site Administrators. Subjects could access their questionnaire through a URL contained within the invitation letters, which also allowed the identity of respondents to be tracked. The initial wave of questionnaires was fielded in the second week of August 2011 beginning with Current Clinicians and concluded in the last week of August 2011 with Site Administrators. When e-mail messages were returned as undeliverable, new email addresses were sought and new invitations were sent. When messages were returned a second time as undeliverable, invitation letters and hardcopy questionnaires were sent by mail, and subjects were also offered a URL for on-line completion, if preferred. Hard copy questionnaires with postage paid return envelopes were sent to all 1998 Remote Alumni by US Mail, because we had current email addresses for very few.

Initial e-mail invitations describing the surveys and containing links to online questionnaires were sent to the 2005 Recent Alumni, 2010 Current Clinician and 2010 Site Administrator samples. Valid e-mail addresses were not available for approximately 33 percent of the 2005 Recent Alumni sample and 4 percent of the 2010 Current Clinician sample; for these, letters describing the surveys and including the links to the online questionnaires were sent through the mail. The online questionnaires and data response collection was conducted using the online survey tool SurveyMonkey® (http://www.surveymonkey.com/).

A fraction of the mailings to 1998 Remote Alumni were returned by the US Postal Service with forwarding addresses noted; these were used for subsequent mailings. In the case of returned and unanswered e-mails, attempts were made to obtain working e-mail and/or street addresses. Up to six periodic follow-up mailings/reminders were sent to non-respondents of each of the targeted groups.

The first wave of hard copy questionnaires to 1998 Remote Alumni contained an invitation letter over the joint signature of the Bureau (BCRS) Director and the study's Principal Investigator. The letter respectfully requested participation to assist the NHSC in improving clinicians' experiences and maximize retention. Participants were assured of anonymity in their responses. E-mails carried similar requests. Subsequent waves of e-mails and paper invitations contained somewhat revised letters/notes to address possible reasons for non-participation, e.g., to assure subjects of the importance of participation of clinicians of all disciplines.

Towards the end of the data collection period, the questionnaire for the 1998 Remote Alumni was shortened from two to one page to simplify participation and maximize response rates. In total, a total of four mailings were sent to the 1998 Remote Alumni cohort.

Survey response rates were followed closely to monitor responses for each of the target groups and within each clinician group the response rate for each discipline. Within each targeted group response rates proved to be generally balanced and, therefore, no special follow-up efforts were required for any subgroups.

C. Response Rate Details

Cohort and Program	Survey Dispositions	TYPE OF HEALTH PROFESSIONAL											
		All Disciplines	Physician	Nurse Practitioner	Physician Assistant	Dentist	Clinical Psychol.	Licensed Profess. Counselor	Social Worker	Marriage and Family Therapist	Dental Hygienist	Pharmac.	Chiro-practor
Current Loan Repayors (2010)	TOTAL	2,740	754	517	287	239	233	259	247	75	129		
	DELIVERABLE	2,668	732	504	281	232	227	251	242	73	126		
	NON-RESPONSE	1,134	352	211	127	93	83	86	94	23	65		
	RESPONSE	1,534	380	293	154	139	144	165	148	50	61		
	ELIGIBLE	1,459	361	275	148	128	141	158	140	49	59		
	RESPONSE RATE	**54.7%**	**49.3%**	**54.6%**	**52.7%**	**55.2%**	**62.1%**	**62.9%**	**57.9%**	**67.1%**	**46.8%**		
Current Scholars (2010)	TOTAL	536	389	39	26	82							
	DELIVERABLE	518	378	38	23	79							
	NON-RESPONSE	239	176	16	9	38							
	RESPONSE	279	202	22	14	41							
	ELIGIBLE	265	195	21	11	38							
	RESPONSE RATE	**51.2%**	**51.6%**	**55.3%**	**47.8%**	**48.1%**							
Recent Alum ni in the Loan Repayment Program (2005/6)	TOTAL	2,393	791	347	261	220	232	198	209	45	54	23	13
	DELIVERABLE	2,279	765	329	246	212	219	185	193	44	51	23	12
	NON-RESPONSE	1,742	591	260	182	180	143	130	153	35	45	16	7
	RESPONSE	537	174	69	64	32	76	55	40	9	6	7	5
	ELIGIBLE	516	170	66	60	32	74	51	38	9	5	6	5
	RESPONSE RATE	**22.6%**	**22.2%**	**20.1%**	**24.4%**	**15.1%**	**33.8%**	**27.6%**	**19.7%**	**20.5%**	**9.8%**	**26.1%**	**41.7%**
Recent Alumni in Scholarship Program (2005/6)	TOTAL	435	182	115	105	33							
	DELIVERABLE	420	175	109	103	33							
	NON-RESPONSE	293	132	64	76	21							
	RESPONSE	127	43	45	27	12							
	ELIGIBLE	126	42	45	27	12							
	RESPONSE RATE	**30.0%**	**24.0%**	**41.3%**	**26.2%**	**36.4%**							
Alumni in Both programs in 1998	TOTAL	857	389	173	189	106							
	DELIVERABLE	728	346	135	149	98							
	NON-RESPONSE	362	170	63	83	46							
	RESPONSE	369	177	74	66	52							
	ELIGIBLE	365	175	74	65	51							
	RESPONSE RATE	**50.1%**	**50.6%**	**54.8%**	**43.6%**	**52.0%**							

D. Retention Outcome Variables

This study's outcome variables were indicators of the retention of NHSC clinicians beyond the end of their NHSC service terms. Retention was specified with respect to (1) remaining within the last NHSC service site and (2) continuing to work in practices that focused on care for the underserved.

In questionnaires to the 2005 Recent Alumni group and 1998 Remote Alumni group, respondents reported the month and year they completed their last NHSC service obligation and reported whether they were still working at their last NHSC service site and if no longer there, the month and year they left. Clinicians also reported each position they worked in after they left the practice where they served in the NHSC, along with the dates, the location, an indication of the type of position (e.g., clinical, teaching, in training) and for clinical positions they indicated whether the practice focused on care for the underserved. Information on positions following NHSC service were reported on the following questionnaire grid used successfully in several of the research team's previous surveys of retention for NHSC and non-NHSC clinicians.

Please list all positions you have worked for six months or longer since leaving your last NHSC practice site. Include periods of other clinical and non-clinical work, as well as periods of training and when you did not work. List current position first, then others going backward in time.

	Start Date		End Date		Position				City/Town	State	Zip (if known)	This organization focuses on care for underserved?	
	Month	Year	Month	Year	Clinical	Other	Specify*						
a.	____	____	current		□	□	→	_	_____	_____	_____	Yes	No
b.	____	____	____	____	□	□	→	_	_____	_____	_____	Yes	No
c.	____	____	____	____	□	□	→	_	_____	_____	_____	Yes	No
d.	____	____	____	____	□	□	→	_	_____	_____	_____	Yes	No
e.	____	____	____	____	□	□	→	_	_____	_____	_____	Yes	No
f.	____	____	____	____	□	□	→	_	_____	_____	_____	Yes	No

*If "Other", please add the appropriate number on the "specify" lines above:

1. non-clinical work
2. in training
3. teaching
4. other work
5. not working

Variables that reflect retention within the last NHSC service site. A continuous variable was created that reflected the total number of months clinicians remained at their last service site after their last NHSC service contract was completed. This was determined by calculating the time between the months and years reported for each of these events. For those who reported they were still working in their last NHSC service sites when they completed the 2011 survey, their retention duration within their NHSC sites was the time between when they completed their NHSC service and the date the questionnaire was completed. A series of dichotomous (yes/no) variables was then created indicating

whether each clinician was retained within their service site at specific times after their NHSC terms were completed, specifically 1 month, 6 months, 1 year, 2 years, 3 years, 4 years, 5 years, 7 years, 10 years and 12 years. For clinicians who completed the +

te retention indicator was coded as “not applicable.”

Variables that reflect remaining in practice with the underserved. A series of dichotomous (yes/no) variables was created reflecting whether clinicians were working in a practice that they report focused on care for the underserved at specific points in time, namely the same 1 month, 6 months, 1 year, 2 years, 3 years, 4 years, 5 years, 7 years, 10 years and 12 years. These variables were created by identifying the practice/position on the questionnaire’s grid shown above where the clinician worked at that point in time, e.g., as of the date that was 6 months after the date the clinician reported they completed their service obligation. Similar variables were used in the previous, 1998 NHSC retention study.

APPENDIX V. SURVEY INSTRUMENTS FOR 2005 RECENT ALUMNI LOAN PAYERS AND 1998 REMOTE ALUMNI

The survey instrument for the 2005 Recent Alumni Loan Repayment Program participants is provided below. Instruments for 2005 Recent Alumni Scholars and for both Current clinician Scholars and Loan Repayors are quite similar and, therefore, are not provided. In the actual, on-line instrument, at the bottom of each survey screen the requisite OMB Control Number and Expiration Date were shown, as was an indicator of the percent of the survey that had been completed at that point and a 'button' to advance to the next item. For space considerations, this information is included on the bottom of the screen from the first page (below) but has been removed from the remainder of the questionnaire presented here. Depending upon a given respondent's answer to some questions, the on-line survey tool directs the respondent to the appropriate next item or set of items; not all respondents are asked to respond to all items of the questionnaire. For completeness, all possible follow-up items are displayed here.

The survey instrument completed by the 1998 Remote Alumni group is included after this first questionnaire. It is brief, focusing on gathering information on jobs and other positions since 1998 (e.g., training, teaching, periods not working), because the earlier, 1998 survey had already gathered (prospective) information about these clinicians' background, families and NHSC practices and communities.

2011 Survey of Recent NHSC Loan Repayment Participants

This questionnaire is intended for clinicians of all disciplines who were serving (providing clinical work) in the National Health Service Corps during 2004, 2005 or 2006. *If you did not serve in the NHSC then, please check the appropriate box below and press "Next" then "Done" to exit the survey.*

- ○ I was never in the NHSC—you have the wrong person
- ○ I served in the NHSC but at no point in 2004, 2005 or 2006

Any explanation/elaboration?

All others please complete the questionnaire. Thank You!

Public Burden Statement: An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control number for this project is 0915-0341. Public reporting burden for this collection of information is estimated to average 12 minutes per response, including the time for reviewing instructions, searching existing data sources, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to: HRSA Reports Clearance Officer, 5600 Fishers Lane, Room 10-33, Rockville, MD 20857

Use of identifiers: All information provided will be handled anonymously and reported in aggregate.

4%

Next

I. TRAINING AND EXPERIENCES PRIOR TO NHSC SERVICE

1a. In what state did you live most of your years before college? State:

1b. In what type of community was this? (*Check one*)

- urban
- suburban
- small town or rural
- N.A., no principal place

1c. In which state and year did you graduate professional school (e.g., medical or dental school)?

State | Year of graduation

1d. ***For physicians and others who completed a residency:***
In which state and year did you complete your residency? *If more than one residency, report the last.*

State | Year of graduation

2a. Did you have any formal training experiences with medically underserved populations during your professional training? (*check all that apply*)

- ☐ No
- ☐ Yes, as student
- ☐ Yes, during residency or fellowship

For those who reported formal training experiences with medically underserved populations:

2b. How many weeks cumulatively were spent in these experiences? Weeks: ☐

2c. Did you participate in the NHSC's SEARCH Program as a student?

- ○ Yes
- ○ No

2d. During your training, how much exposure did you have to: (*check one number on each line*)

	None 1	2	Moderate Exposure 3	4	Extensive Exposure 5
1. community and/or migrant health centers?	○	○	○	○	○
2. rural health care?	○	○	○	○	○
3. inner city health care for the poor?	○	○	○	○	○
4. past and/or current NHSC clinicians?	○	○	○	○	○

3. What was your approximate outstanding educational debt when you completed your training? *(enter numbers only; no commas)*

Amount in $ ☐

II. JOINING THE NHSC AND SELECTING YOUR FIRST NHSC SERVICE SITE

4a. When did you begin your Loan Repayment Program service?

	Month	Year
Month & Year:		

4b. How much do you agree or disagree with each statement below about your reasons for applying to the NHSC Loan Repayment Program. *(check one response for each question)*

	Strongly Disagree 1	2	Neutral 3	4	Strongly Agree 5
I needed financial assistance to pay off educational debt.	○	○	○	○	○
I wanted to provide care to an underserved population or area.	○	○	○	○	○

5. Where was your first practice/site where you began working as part of the NHSC Loan Repayment Program?

Practice/Organization name:

City/Town: State: Zip:

6. When did you begin working in this practice/site?

	Month	Year
Month & Year:		

7. Were you already working in this practice/site when you applied for NHSC Loan Repayment?

- No
- Yes

7a. About how many months had you worked in this practice before *applying* for loan repayment?

Number of months

7b. When you decided to work in this practice, did you know it might be eligible for NHSC loan repayment?

- Yes
- No

8. Where would you likely have worked if you had not participated in the NHSC? *(check all that apply)*

- ☐ in the same practice
- ☐ in a rural practice
- ☐ in an inner city practice
- ☐ in an underserved area
- ☐ in a community or migrant health center
- ☐ Other *(specify)*

9. How important to you and your family were each of the following considerations when choosing to work in your first NHSC practice/site? Did the practice and community you chose meet your needs?
(check responses for both "importance" and "need met" on each line)

	Importance					Need met at your first NHSC practice site?	
	Not Important 1	2	Somewhat Important 3	4	Very Important 5	Yes	No
a. Working with a specific socioeconomic or ethnic population	○	○	○	○	○	○	○
b. Working at a specific, known site that you already had in mind.	○	○	○	○	○	○	○
c. Working in a specific area (e.g., near family or in a particular state)	○	○	○	○	○	○	○
d. Having ready access to specific activities like fishing, hiking, fine dining or theater	○	○	○	○	○	○	○

III. ABOUT YOUR FIRST NHSC SERVICE SITE

10. Which one of the following best describes your first NHSC practice/site? (*check one*)

- ○ community or migrant health center
- ○ rural health center
- ○ other primary care practice
- ○ Indian Health Service (IHS) site
- ○ tribal site
- ○ prison
- ○ city or county health department
- ○ dental practice—group or private
- ○ mental health or substance abuse facility
- ○ nursing home
- ○ university-based clinic or service
- ○ hospital-based clinic or service
- ○ Other *(specify)*

[ ]

11. How many patient/client visits or encounters did you have on a typical day in all settings (e.g., office & hospital)?

Total Visits per Day [ ]

12. How many weekday evenings and weekend days on average per week were you on call (apart from scheduled clinic hours)?
(respond "0" if you did not take call)

13. How much do you agree or disagree with the following statements about your work in your first NHSC practice/site while you were serving in the NHSC?
(*check one response for each line*)

	Strongly Disagree 1	2	Neither Agree nor Disagree 3	4	Strongly Agree 5
a. I had good clinical back-up from more senior and/or supervising clinicians at my practice.	○	○	○	○	○
b. I was able to provide the full range of services for which I was trained and wished to perform.	○	○	○	○	○
c. The practice had an effective administrator.	○	○	○	○	○
d. Work rarely encroached upon my personal time.	○	○	○	○	○
e. I felt a strong personal connection to my patients.	○	○	○	○	○
f. I felt I was doing important work in this practice.	○	○	○	○	○
g. I felt a sense of belonging in the community where I worked.	○	○	○	○	○
h. I felt appreciated by NHSC staff for my work.	○	○	○	○	○
i. Overall, I was pleased with my work.	○	○	○	○	○
j. Overall, I was satisfied with my practice.	○	○	○	○	○

14. How satisfied were you with the following aspects of your first NHSC practice/site during the years you were serving in the NHSC? (*check one response for each line*)

	Very Dissatisfied 1	2	Neutral 3	4	Very Satisfied 5
a. your relationship with the practice administrator	○	○	○	○	○
b. financial stability of the site / practice organization	○	○	○	○	○
c. physical condition of the healthcare facility	○	○	○	○	○
d. your salary or income from your practice	○	○	○	○	○
e. availability of cross coverage to allow you to leave town	○	○	○	○	○
f. mission and goals of the practice	○	○	○	○	○
g. your access to specialist consultations for your patients	○	○	○	○	○
h. support by other clinicians working at the site	○	○	○	○	○
i. the contacts and other support you received from NHSC staff	○	○	○	○	○

15a. What was your annual salary or income when you began working in your first NHSC practice/site?

Amount in $ ☐

15b. What was your most recent or last annual salary or income in this practice?

Amount in $ ☐

---

16. Did you teach students or other learners at your first NHSC practice/site when you were serving in the NHSC?

- ○ Yes
- ○ No

For those who reported that they taught students or residents while working at their first NHSC practice/site:

16a. If yes, about how many half-days per month did you teach?

Number of half-days per month ☐

17. How much do you agree or disagree with each of the following statements about the community where you lived while working in your first NHSC practice/site and serving in the NHSC?
(*check one number on each line or "Not Applicable" if you did not have a spouse or partner or didn't have children*)

	Strongly Disagree 1	2	Neutral 3	4	Strongly Agree 5	Not Applicable
a. My spouse/partner was happy in the community.	○	○	○	○	○	○
b. Satisfactory professional opportunities for my spouse/partner were available in the community.	○	○	○	○	○	○
c. My children were happy in the community.	○	○	○	○	○	○
d. Satisfactory educational opportunities for my children were available in the community.	○	○	○	○	○	○
e. My family was concerned about personal safety in the community.	○	○	○	○	○	○

IV. JOB CHANGES AND YOUR FUTURE

18. Did you complete your initial two-year NHSC Loan Repayment Program contract/term with service?

- ○ Yes
- ○ No

For those who completed their initial two-year NHSC Loan Repayment Program contract/term with service:

18a. When did you complete that initial two-year contract?

	Month	Year
Month & Year:	▼	▼

For those who did not complete their initial two-year NHSC Loan Repayment Program contract/term with service:

18b. If no, what happened with your initial NHSC Loan Repayment contract obligation? (*check one below*)

- ○ I am now serving my initial NHSC Loan Repayment contract
- ○ I am now in deferment for my initial NHSC contract
- ○ I paid the required amounts to buy out of part or all of my initial NHSC contract
- ○ The NHSC now considers me in default
- ○ Other: *Specify:*

19. Did you *apply for* one or more renewal ("amendment") Loan Repayment contracts to extend your NHSC service? (*check one*)

- ○ No
- ○ Yes, I applied, but I wasn't granted a renewal
- ○ Yes, I applied and was offered a renewal contract but decided not to take the renewal offer
- ○ Yes, I signed a renewal contract

20. Are you still working in the same practice where you first served in the NHSC?

- ○ Yes
- ○ No

For those no longer working in their first NHSC site:

20a. When did you leave your first NHSC site?

	Month	Year
Month & Year:		

21a. Please list all positions where you have worked for six months or longer since leaving your first NHSC practice site.
Include periods of clinical and non-clinical work, as well as periods of training and when you did not work.
List current position on top, then list earlier positions beneath going backward in time

Current Position

Start Date Month/Year	End Date Month/Year	Type of Position	City/Town, State, Zip (if known)	This organization focuses on care for underserved?

:

Up to four positions are provided in this response

:

Start Date Month/Year	End Date Month/Year	Type of Position	City/Town, State, Zip (if known)	This organization focuses on care for underserved?

21b. If you are now in clinical practice, what proportions of the patients are covered under: *(Numbers may not total to 100%)*

Medicaid (%)	
Medicare (%)	
IHS or tribal coverage (%)	
uninsured (%)	

22. The following questions are about your current career plans. Respond on each line with a single year estimate if able, otherwise a range of years. Check "NA" when not applicable.

Looking ahead, how many more years do you think you will:

	Single Year Estimate		Range of Years At Least		Range of Years At Most	
a. remain in your current practice/site?		OR		to		
b. remain practicing in your current community?		OR		to		
c. remain in rural practice?		OR		to		N/A
d. continue practicing with a medically underserved population?		OR		to		N/A

V. YOUR BACKGROUND AND FAMILY

23. Year of birth:

24. Your gender

- ○ Male
- ○ Female

25. Are you of Hispanic origin?

- ○ Yes
- ○ No

26. Race: (*check all that apply*)

- ☐ White
- ☐ Black or African American
- ☐ American Indian or Alaska Native
- ☐ Other *(please specify)*
- ☐ Asian
- ☐ Native Hawaiian or other Pacific Islander

27. Were you married or did you have a partner at any point while working in your first NHSC practice site?

- ○ No
- ○ Yes

For those who reported having been married or having had a partner at any point while working in their first NHSC practice site:

27b. In what state did your spouse/partner live when growing up? State:

27c. In what type of community did your spouse/partner grow up? (*check one*)

- ○ urban
- ○ suburban
- ○ small town or rural
- ○ Not applicable, no principal place

VI. YOUR EVALUATIONS AND RECOMMENDATIONS

28a. Considering all of the experiences you have had with the NHSC Loan Repayment Program, how satisfied are you with this Program? (*check one*)

Very Dissatisfied					Neutral					Very Satisfied
1	2	3	4	5	|	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

28b. To what extent did the NHSC Loan Repayment Program fall short of or exceed your expectations? (*check one*)

Fell Well Short					Met My Expectations					Far Exceeded My Expectations
1	2	3	4	5	|	6	7	8	9	10
○	○	○	○	○	○	○	○	○	○	○

29. What can the NHSC leadership and staff do to make the NHSC a better program for its clinicians?

30. What can the NHSC do to make it more likely that its alumni would continue to serve needy populations?

This is the end of the survey. If you would like to change any of your answers, please press the "Prev" button to go to a previous page or pages. If you are finished, please press "Done" to submit your responses and complete the survey.

Thank you for completing the survey!

Done

Name
Address
City, State, Zip

August 24, 2011

Dear Name:

We are writing to you on behalf of The National Health Service Corps (NHSC), which has commissioned this survey of a selected sample of its current and past clinicians, and also NHSC clinic site administrators. The last external survey of the NHSC was a dozen years ago and much has happened since then. In the past two years alone the Corps has updated its programs and more than doubled in size. The NHSC now needs solid information and feedback on its current and past performance to further improve its programs and to best serve its dedicated practitioners and the communities where they work.

Learning from the experiences of NHSC clinicians is vital to assessing and improving the Corps. Hence, we are asking you to complete and return the enclosed 10-minute survey-by filling out the enclosed questionnaire and returning it in the enclosed envelope.

This survey is being conducted by researchers at the University of North Carolina at Chapel Hill and at Quality Resource Systems, Inc., of Fairfax, Virginia. The information you provide will be combined with others' responses and presented anonymously to the NHSC leadership and in the published findings. Please be candid in your comments. The NHSC wants input from clinicians of all disciplines, whether you are still working at your NHSC service site or now work elsewhere.

Please take a few minutes now to complete the survey and help the NHSC best meet the needs of underserved communities. If you have questions about this survey, feel free to contact project staff at NHSCRetentionSurvey@qrs-inc.com.

Sincerely

Donald Pathman, MD MPH
Project Principal Investigator
Professor of Family Medicine and
Cecil G. Sheps Center for Health Services Research
University of North Carolina at Chapel Hill

Rebecca Spitzgo
Director, National Health Service Corps
Associate Administrator, BCRS
Health Resources and Services Administration

2011 Survey of NHSC Alumni from the Late 1990s

This questionnaire is intended for you as a clinician of any discipline if you served in the National Health Service Corps in the late 1990s. We want to hear from you whether or not you completed your NHSC service and regardless of where you have worked since. We seek to learn where people's careers have taken them over the past ten years.

If you were not in the NHSC in the late 1990s, either in the Scholarship or Loan Repayment Program, please check the box below and you do not need to complete the rest of the questionnaire but please mail it back to us in the enclosed envelope.

□ I was not serving in the NHSC in the late 1990's
Any explanation/elaboration?

_____

_____

All others please complete the questionnaire. Thank You!

Public Burden Statement: An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control number for this project is 0915-0341. Public reporting burden for this collection of information is estimated to average 8 minutes per response, including the time for reviewing instructions, searching existing data sources, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to: HRSA Reports Clearance Officer, 5600 Fishers Lane, Room 10-33, Rockville, MD 20857

1. Did you complete your NHSC contract (service obligation) by providing clinical service in a NHSC site?

   1. Yes → If "yes", when did you complete your contract/service (including after any new or "amendment" contracts with the NHSC Loan Repayment Program)?
      Month: _____ Year: _____

   0. No → If no, did you . . . (*check one box*)

      a. buy out of all or part of your contract?
      b. default on all or part of your contract?
      c. receive a waiver from the NHSC for all or part of your contract?
      d. other? *Please explain:* _____

2. After completing your original NHSC contract, did you sign a new or "amendment" contract with the NHSC Loan Repayment Program?

   1. Yes 0. No

3. According to the NHSC's records, you were serving at the following location in December 1997.

   Practice name: _____ City: _____ State: _____

   a. Was this indeed your principal NHSC work address in December 1997?

      2. Yes

      1. No, I was serving in the NHSC then but at a different location: (*please identify*)

Practice name: _____ City: _____ State: _____

0. No, I was not serving in the NHSC in December 1997.

b. Was the practice we or you identified in 3a. your last NHSC practice, i.e., you didn't change sites even if you served a new or "amendment" NHSC Loan Repayment Program contract? *(over)*

1. Yes, this was my last NHSC practice site

0. No, I finished my NHSC service at a different site. → *Please identify:*

Practice name: _____ City: _____ State _____

4. Is the practice we or you identified in 3a. still the principal practice where you work?

1. Yes → If yes, please skip to question 6 below.

0. No → If no, when did you leave this last NHSC site? Month: _____ Year: _____

5. Please list all positions you have worked for six months or longer since leaving your last NHSC practice site. Include periods of other clinical and non-clinical work, as well as periods of training and when you did not work. List current position first, then others going backward in time:

	Start Date		End Date		Position				City/Town	State	Zip	This organization focuses on care for underserved?	
	Month	Year	Month	Year	Clinical	Other	Specify*				(if known)		
a.	_____	_____	_____	_____	□	□	→	__	_____	____	_____	Yes	No
b.	_____	_____	_____	_____	□	□	→	__	_____	____	_____	Yes	No
c.	_____	_____	_____	_____	□	□	→	__	_____	____	_____	Yes	No
d.	_____	_____	_____	_____	□	□	→	__	_____	____	_____	Yes	No
e.	_____	_____	_____	_____	□	□	→	__	_____	____	_____	Yes	No
f.	_____	_____	_____	_____	□	□	→	__	_____	____	_____	Yes	No
g.	_____	_____	_____	_____	□	□	→	__	_____	____	_____	Yes	No

*If responded Other, please note appropriate number above:

1. non-clinical work
2. in training
3. teaching
4. other work
5. not working

6. If you are now in clinical practice, what proportion of the patients in your current practice are covered under: *(Numbers may not total to 100%)*

1. Medicaid ____% 2. Medicare ____% 3. IHS or tribal coverage ____% 4. uninsured _____%

0. □ check if you are not now in clinical practice

YOUR RECOMMENDATIONS

7. What can the NHSC leadership and staff do to make the NHSC a better program *for its clinicians*?

_____

_____

_____

8. What can the NHSC do to make it more likely that its alumni would continue to serve needy populations?

_____

_____

_____

Please send completed survey to: NHSC Survey, c/o Quality Resource Systems, Suite 100, 11350 Random Hills Road, Fairfax, VA, 2203