

Maximizing Successful Pursuit of Health Careers in Micronesia: What to do?

Kelley Withy, MD, MS, PhD*
Nia Aiototo, MPH**
Shaun Berry, MD*
Francine Amoa*
Faye Untalan, DrPH***

University of Hawai'i, John A. Burns School of Medicine; **Papa Ola Lokahi, Native Hawaiian Healthcare System; *Commonwealth of the Northern Mariana Islands Area Health Education Center*

Primary Contact Author: Kelley Withy, MD, MS, PhD, Director, Hawaii/Pacific Basin Area Health Center, University of Hawai'i, John A. Burns School of Medicine, 651 Ilalo St., MEB 4th Floor, Honolulu, HI 96813, Tel: (808) 692-1070, Cell: (808) 429-8712, Fax: (808) 692-1258, Email: withyk@hawaii.rr.com. (Assistant: Kimberly Yamauchi, Tel: (808) 692-1060, kimy@hawaii.edu)

Funding for this project provided by DHHS HRSA BHP AHEC grant 2 U76HP 00578-11 and NIH CRC grant: P20 RR11091-11

Abstract

The people of the U.S. Associated Pacific Islands (USAPI) suffer significant health disparities when compared with industrialized countries. One explanation for this is lack of an adequate supply of skilled healthcare workers. The current research examines the factors that current health professionals from the region describe as helping and hindering them in their pursuit of health careers, as well as the barriers seen by students, educators and health professionals. Methods: Two separate interview studies were conducted with a convenience sample of individuals in the five USAPI jurisdictions in the Northern Pacific. The first study utilized the responses of 15 individuals regarding the barriers to the pursuit of health careers in order to develop a logic model map of the most common problems in the pursuit of health careers. The second study involved in-depth questions of 32 health professionals regarding barriers to and facilitation of health career training. Results were analyzed using constant comparative analysis. Results: Interview results indicate that facilitators of students pursuing health careers included having a family member working in healthcare, the desire to help people, available training opportunities and personal experiences. Facilitators of completion of training included family support, financial support, personal commitment and social support during school. Barriers to pursuit and completion of training included limited academic preparation, exposure and guidance, family obligations and other careers seen as being more desirable. Discussion: Efforts to improve successful pursuit of health careers should start at the family level and must give a clear message to students that their goal is supported. Furthermore, there should be significant effort given to: improving the academic preparation provided for students, making career information available to students, and providing financial support, mentoring and guidance. Homesickness was a significant barrier that could be decreased by regional programs or a support system at locations with concentrated pockets of students from a given area. (PHD 2007 Vol 14 No 1 Pages 57 - 65)

Introduction

The people of the U.S. Associated Pacific Islands (USAPI) suffer significant health disparities when compared with industrialized countries, including high rates of both non-communicable diseases and infectious diseases such as kwashiorkor, marasmus, Vitamin A deficiency, dengue fever, measles, and cholera.^{a,b,c} In fact, compared to the U.S., the USAPI countries have an average life expectancy up to 12 years shorter and infant mortality rates up to six times higher.^d While disparities are greater in some jurisdictions than others, one factor potentially contributing to these disparities is

the lack of a health workforce large enough to meet all the healthcare needs. As an example of this, the U.S. Bureau of Health Professions cites health professions shortage areas scores between 4 and 22, with 25 being the most severe.^e Therefore it is important to develop the local health workforce that will care for the medical and public health needs of the region.

Currently there are four associate degree nursing programs and one baccalaureate nursing program in the region. However there is no regional medical school or allied health training program since the closing of the Medical Officer Training Program in Pohnpei in 1997. The University of Fiji School of Medicine offers distance public health training and the University of Hawai'i at Hilo recently began offering distance pharmacy technician training. However many students must leave the region for training. These students face significant challenges

not only in pursuing health careers, but in completing the training so far from their family and support system. In addition, retention in training is lower for minority students in the US, as underrepresented minority students tended to switch to other fields more often than non-minority students^f and African Americans have higher drop out rates than Caucasians.^g

The medical and social sciences literature, documents many challenges for students from industrialized countries such as minority students experiencing lower perceived ability and control and the concern that ethnic minority students may be labeled as having less ability, possess low self-esteem, and are often clustered together in classes without teachers who are content experts.^{h,i} Maton describes the likelihood that minority students suffer academic and cultural isolation, motivational and performance vulnerability in the face of negative stereotypes resulting in low expectations for performance, non-supportive peers and discrimination.^j

Factors that are described in the literature as correlating with pursuit of health careers include socioeconomic factors (higher income), academic ability, cultural values conducive to education and a supportive background environment.^k Factors found to be directly related to continuation in educational programs were: financial support, program staff, research internships and mentors, existence of a program community and strong positive expectations of their high academic potential from faculty.^{7,l} However, there is no literature to demonstrate that these factors are the most significant in the Northern Pacific.

In order to elucidate factors that would help in the goal of expanding the workforce of the region, the investigative team performed two separate sets of interviews to draw out ideas about the barriers to pursuit of health careers training students, from the viewpoint of students, educators, and providers and to gain insight into the recruitment and training needs of healthcare workers from the perspective of those who successfully completed training and returned to practice in the region.

Methods

Two separate interview studies were conducted with different subjects and are described here independently as: logic model mapping interviews and qualitative

interviews. Human subjects exemption was obtained from the University of Hawai'i Committee on Human Subjects and the Belau National Hospital.

Logic Model Interviews

Convenience sampling was utilized to recruit 15 educators, students and healthcare providers readily accessible to the researchers through their affiliation with Pacific Basin Area Health Education Centers (AHECs) in Micronesia and their participation in healthcare worker conferences. In August of 2005, 15 individuals representing education and health fields from the five Northern Pacific USAPI countries were interviewed individually by the first and last authors. Each interview began with the question: Why do so few students pursue health careers? Individuals were interviewed in English and the answers were solicited in a sequential disclosure format to create a logic map for each interview (increasingly detailed explanations). The

results were then compiled into a single map with like answers combined. The resulting map was emailed or mailed to participants for their approval and corrections.

Qualitative Interviews

A second study was conducted between March and August 2005. Ten interview questions were developed based on a comprehensive review of existing literature and results from informal discussions with teachers, providers and students in the countries of Micronesia. The original questions were refined through team discussions and input from internal experts and

community educators. The final research questions utilized were:

Convenience sampling was again used to recruit 32 participants who were present at regional medical conferences, during visits for other medical research studies, and from the faculty and trainees known to the Pacific Basin AHECs. Participants not practicing in Micronesia were excluded. The initial target number of interviews was 20, with at least three healthcare workers from each jurisdiction. Because a small amount of grant funding was obtained, the researchers were able to increase the number of interviews to 33. Of those individuals, only one declined study inclusion. Each interview was conducted in person, by the first or second author, often in the primary language of the interviewee (it is estimated that ten interviews were conducted in English entirely). Interviews lasted an average of 45

Factors that are described in the literature as correlating with pursuit of health careers include socioeconomic factors (higher income), academic ability, cultural values conducive to education and a supportive background environment

minutes. The questions were asked in an open-ended fashion, such that participants were allowed to offer multiple answers. At least 27 participants provided answers to all questions. Data was recorded by the interviewer in the form of notes and when available, a tape recorder. The notes and tapes were transcribed and results were typed in English for each question. The research team met to analyze the results. They reviewed all answers without the participant demographics to maintain confidentiality. Qualitative responses were clustered by themes using card sorting and negotiation between the researchers. Responses by theme were then tabulated for frequencies and the researchers negotiated the most important participant comments for dissemination.

Results

Demographic Characteristics

Logic Model Map Interviews

Fifteen individuals were interviewed representing three health professions students, two administrators, four educators and six practitioners (MD, MO, RN, MPH) from Saipan, Guam, Yap, Palau, the Republic of the Marshal Islands. Two of the participants were Caucasian, the rest representing the ethnicity of their practice location. Six of the participants were male and nine female.

Qualitative Interviews

In total, 32 interviews were conducted representing 14 physicians (MD or MO), 14 nurses and four public health workers or medical technicians. The interviews were distributed over the five USAPIs previously mentioned. Interviewees were evenly balanced between males and females (16 men and 16 women). Twenty-eight of the interviewees saw patients ≥20 hours a week and four (primarily nursing and public health) spent <20 hours a week in direct patient care. Question 3 regarding patient demographics was difficult for all participants to answer as there is very little insurance in the region and the patients are primarily of the local ethnicity, "We see whoever comes."

DATA

Logic Model Analysis and Map Creation

The 15 interviews had significant overlap and were combined into one map that is represented in Figure 1. The four primary antecedent conditions were found to be limited academic preparation, negative perceptions of health careers and health careers training, lack of exposure to health careers and lack of guidance.

Figure 1: Abbreviated Logic Model Map

Limited academic preparation was the most commonly cited reason for students not pursuing health careers. Particular mention was made of math and science education, but also English, since most medical training programs that students would attend are in English. There was also significant discussion of the learning styles of the region being more hands-on and oral compared with the 'Western' written educational and testing style. Reasons for poor academic preparation included internal factors (students not pushing themselves, lacking study and time management skills), school specific (lack of experienced teachers and educational resources due to low funding) and external (low expectations from society, lack of encouragement from family and teachers).

Figure 1: Abbreviated Logic Model Map

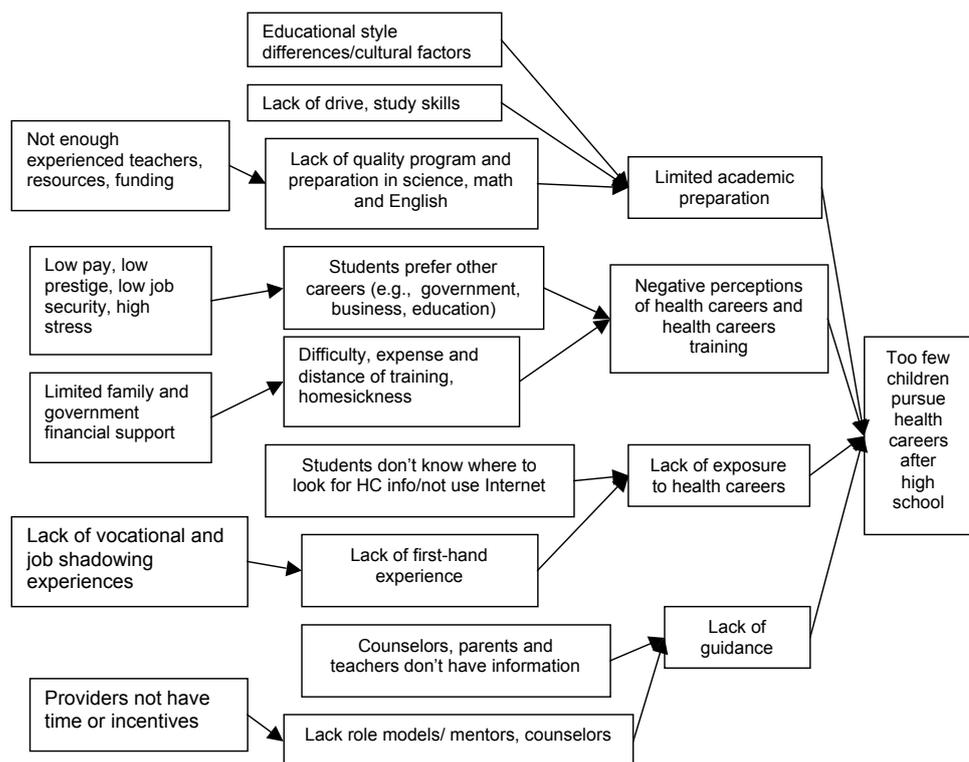


Table 1: What interested you in a health career?

Family member was a healthcare provider	13
Desire to help people	9
Health career opportunity opened up	7
Personal experience with healthcare system	6
Social encouragement/mentor/role model	5
Desire for respect	4
Good in school	2
Interest in subject	2
Desire for good salary	1
Family encouragement	1

Negative perceptions of health careers and health careers training was reported by many participants. The primary reason for this was that family and teachers discourage children from health careers. The fact that other jobs are much more appealing is also a factor. Participants described health careers as having low pay, associating negative perceptions with them (bed pans, long hours), and believing that non-health government jobs paid better and had more job security. Also of note, the training was known to be expensive and would cause at least temporary displacement from home. Homesickness was a definite theme preventing people from pursuit of health careers. The lack of significant government funding for training and local programs was noted repeatedly.

Lack of Exposure to Health Careers

It was described that students rarely get hands-on experience with medical providers and that the region lacks effective vocational programs or shadowing experiences due to lack of human resources. It was noted that there is a lack of curriculum and not enough collaboration between schools and future employers to market available careers.

Table 2: What helped you complete your training?

Family support (including image, prestige)	26
Financial support (family and government)	17
Personal commitment (dedication, discipline and focus)	17
Social support during school (faculty, role model, counselor, colleagues)	8
Cultural aspects of the job (the fact that it is hands on)	5
Education (in Hawaii, in English)/Tutoring	4
Desire to make more money/Prestige/Respect	3
Job opening	1
Prayer/faith	1

Lack of Guidance

Participants noted that there were not enough career counselors, and the ones that were present were too busy to help all children. Role models and mentors were also lacking, in part because professionals did not have time or incentives to go into schools to do recruitment or have students work with them in their offices. A theme throughout the project was also lack of information. Counselors, parents and teachers don't have information about health careers, therefore students don't get the guidance they could.

Qualitative Results

Of the 27 participants who answered the question regarding location of education, only nine remained in Micronesia for all of their post secondary training. The rest completed training outside of Micronesia, in areas including Hawaii, Fiji, Papua New Guinea and the continental U.S.

Positive Forces in Health Careers

The most important factor positively affecting students interested in health careers was a family member in healthcare (13/32). The desire to help people (9/32) and opportunities becoming available in health care training (7/32) also impacted the pursuit of health careers. Personal experiences with the healthcare system (6/32) such as having to wait for long periods to see the doctor as a child and the desire to correct the situation was the third most frequent answer. Social encouragement from a mentor or role model (5/32) was reported less than half as frequently as was having a family member in the profession. Finally, the desire for respect was an occasionally reported factor (4/32), but the desire for a good salary was only cited by one individual (Table 1).

Help with Completing Training

Family encouragement (26/32) was the primary factor influencing the completion of training for the providers interviewed. Multiple participants stressed the importance of not embarrassing or disappointing the family and upholding the family's image by avoiding shame. Financial support (17/32) and personal commitment (17/32) were the second most frequently described factors influencing completion of training. Seventeen respondents identified these factors as important. Social

Table 3: Barriers to Pursuit of Training

Poor foundation training/limited educational opportunities/entrance exam	28
Other fields are more attractive (easier training, less physically demanding, better pay)	13
Lack of adequate counseling, mentoring, role model	10
Lack of funding	6
Lack of emotional support from family	5
Geographic separation from family	4
Desire to start a family	1
Lack of health careers class	1

Barriers to Pursuit

Study participants offered many descriptions of barriers in the pursuit of health careers which most often relate to the lack of education and early knowledge of the benefits of health careers as seen in Table 3.

support during school in the form of faculty guidance, role modeling, counseling and colleague support was important to eight of the 32 interviewees as described in Table 2.

As shown in Table 3, the factor that was seen as the greatest barrier to pursuing health science careers in Micronesia was academic preparation (28/32). Many individuals felt that they were not academically prepared for the entrance exams while others cited their lack

Many participants described the difficulties of going to a

Table 4: Barriers to Completing Training

Lack of structured health careers preparation program, mentors, role models, peer support	16
Lack of foundation and English training	13
Family obligations	12
Lack of funding	7
Cultural differences/a different educational system	6
Poor infrastructure in country	1
Family separation	1

new place and feeling homesick and alone, disconnected from their family and needing someone to keep them on track with their studies. Respondents also reported having considered quitting, or having friends who quit to work at fast food restaurants because they felt discouraged, and the pay seemed high in comparison to pay scales they had experienced.

of basic foundational training in math, science and especially English. A second barrier was the impression that other fields of work were more lucrative and less labor intensive, therefore, making them more appealing to students (13/32). The lack of role models, mentoring and career counseling was described as an obstacle to pursuit of health careers (10/32). Finally, the lack of funding was cited by six individuals, and the lack of emotional support from family was noted by five.

Table 5: What Would Help Students Pursue Training Today?

Better K-12 preparation, customized tutoring	16
Health science track in high school with career counseling, mentoring, outreach network, summer internship, adds on the radio	12
Social support for transition to college	11
Better working environment/better pay/continuing ed	9
Family support	3
Training being more community focused and in-country	2
More scholarships	2

Table 6: Advice for Students

Get a strong educational foundation early	11
Make sure it is what you want to do	9
Focus/do not give up	5
Don't worry about cost	1
Don't get married yet	1
Stick together and help one and other	1
Tell your family "no"	1

Barriers to Completion of Training

When healthcare professionals were asked what barriers they felt made it difficult to complete healthcare training, structured pipeline programs, educational quality and family obligations were most commonly described (see Table 4).

The most common barrier to completion of training was the lack of a structured health careers preparation program (16/32) that included mentors, tutors, role models and peer support in high school (16/32). The second greatest barrier was the lack of foundation training (13/32), especially in English. In particular, participants felt they could not keep up with the coursework of college and graduate school. Family obligations (12/32) were the third most common barrier described by participants as a challenge. Most individuals felt family pressure to return home to help their families financially or pressure to have children. Lack of funding (7/32) was described as a challenge by seven individuals. Cultural challenges (6/32) with the different educational system and learning new educational modalities were described by six people.

For Today's Students

Participants felt that the most important factor to help students today was better educational preparation (16/32). It was felt that this should include mentors and the existence of health science training tracks in high school to include components such as mentoring, counseling and outreach to community (12/32). Eleven individuals described the importance of social support for the transition to college and professional school. Almost a third of the interviewees felt that the one thing that needs to change for more students to go into health careers is creating a better working environment for healthcare providers when they return after training (9/32).

Advice to Future Students

Respondents all had ideas for students who may be

thinking about health careers. These included providing a strong educational foundation (11/32) and vocational counseling to assure that this career is what they want to do (9/32). Staying focused was also felt to be important (5/32). Other factors mentioned included not having to worry about the cost, not getting married early, sticking together, helping one another and telling your family "no."

Discussion

The importance of family on health careers was found to be high in the population studied. Unlike U.S. mainland students, the factor most likely to foster interest in a health career turned out to be a family member in healthcare. The interviewees indicated that the family member was not necessarily in the same field of healthcare that they chose to pursue, and that the effect was separate from that of a role model or mentor. Family support was the most cited factor influencing the ability to complete health professions training, while simultaneously, family obligation was the third most common barrier to completing training. Family support was also mentioned as an important factor in support of students' health careers training while at the same time the respondent's advice for future students was to say "no" to your family. In addition, lack of family support, geographic separation from family and the desire to start a family were mentioned as barriers to pursuing health careers.

While family support is probably the single greatest positive factor impacting health workforce career choice in this population, family opinion is also one of the most common barriers to health careers completion. Respondents explained that for Micronesian students, it is important to be part of a family or clan. That clan shares your identity and what you do reflects upon them. Therefore, both pride and shame are shared throughout the family unit. However, families often do not see the value of pursuing a career which requires a prolonged course of study but would prefer their youth to get jobs and help the family out immediately. Some students had to quit training to care for aging family members and others to help run family businesses. If it was requested of them, they had little choice but to subjugate their career goals for their family. In addition, many women were pressured to start families and not pursue what is still considered by some to be 'men's work.' Families also provide some of the financial support required for training in addition to social support. If a student is to be successful, therefore, it is very important to have family support.

Guidance and mentoring are very important to the process of health careers training

Academic and Social Preparedness

Academic preparation was discussed in both interview studies as a very important consideration in the ability to pursue a health career. Limited quality of math, science and English education were clear cut difficulties for students. Math skills have been documented in the literature as very important to student success in health related fields. Students with higher average 8th grade math test scores were more likely to take math in high school and more likely to major in science and math in college;^m science-mathematics self-efficacy was the factor most closely linked to career interest in science and was closely linked to academic performance as demonstrated by PSAT scores;ⁿ math performance, particularly in early high school, was highly correlated with college preparatory grade point average, eligibility and college type;^o and the likelihood of entering science and engineering postsecondary education was highest for students who took advanced science courses, were self motivated to study science, and had parents with higher levels of education and high expectations for college education for their children.⁶ Therefore, it follows reason that academic preparation should be addressed if there is to be a change in the number of students successfully pursuing health careers.

Also, interviewees described how Micronesian students are accustomed to learning through oral histories and accomplishing tasks in a group setting. This is very different from the Western style of individual learning and written examinations. Therefore, there is a large cultural adjustment to be made when leaving the region for health professions training. Whether this can be taught in preparation for leaving, or regional programs can adapt to this need remains to be seen.

Guidance and Mentoring

Guidance and mentoring are very important to the process of health careers training. While growing up, there needs to be more opportunities for students to experience health careers in a positive way, and more ways to get information about health careers to students, counselors and parents. Other research has shown that different ethnic groups respond best to different types of support: Native Hawaiian students preferred addressing issues of low self esteem; Filipino students described the need to confront family responsibilities; and Samoan students remarked on homesickness and environmental factors.^p Our research found that there is a special bond

that is formed among Pacific Island students such that social groups are described as “surrogate” families. A great majority of those interviewed indicated that their Micronesian classmates are considered “brother” or “sister.” Participants described the need for a social structure allowing for group activities of Micronesian students, positive peer pressure to study harder and complete training, and tutoring assistance to help with the adjustment to a new learning style. Local clubs, resources centers, tutors, counselors and role models are important and were recommended because students are more likely to complete training if they are guided, supported and helped through the educational process. Respondents felt that this would be easier if the training

program were located closer to home and utilized a learner centered, culturally appropriate methodology that would maximize learning for Micronesian students.

Role Models

Role models and peer mentoring have proven very significant to career success in the literature,^q with self efficacy (personal belief about level of ability) correlating with positive role models.^r However the lack of exposure to role models is a common theme in

Micronesia. Since there is a lack of adequate workforce, it follows that there are not enough role models. In addition, healthcare workers are described as too busy to go into schools and talk about their careers. Being overworked is also a factor discouraging students from considering healthcare a desirable field. Participants described the need for a better working environment and better pay for healthcare workers, in order to increase the interest in such careers today. Study participants indicated that a strong vocational training program that: began at an early age, included mentors, role models, in-school activities and special tutoring would improve interest in health careers, as would, increased funding for schools, teachers and guidance counselors.

In the group of Micronesian healthcare professionals interviewed, personal commitment was very high, and fear of failure, or bringing shame to their family, was a significant motivator not usually described in U.S. populations. Interestingly, racism was never mentioned by the participants, although cultural differences were noted. This may be due to the fact that most of the students attended schools in Hawaii, Papua New Guinea and Fiji for their post graduate training, areas that are more diverse than most schools in the U.S. Future research should be directed to examine the specific

**In the group of
Micronesian healthcare
professionals
interviewed, personal
commitment was very
high, and fear of failure,
or bringing shame
to their family, was a
significant motivator not
usually described in U.S.
populations**

influence of having a family member in healthcare or the pursuit of health care as a profession, this is not clear from the present study.

Limitations of this study include the small numbers of individuals interviewed; however, many of the answers converged such that the authors believe that the results can be generalized to the region. Because each participant was not pressed for an answer to each question in the second study, and some participants offered more than one answer, it is likely that the opinions of more vocal participants were overrepresented. In addition, participants were not queried regarding their age or their years of practice, therefore, differences in responses based on these factors were not analyzed. These potential biases could be addressed by performing a written survey of all healthcare workers in the region and using a statistical analysis program to analyze the larger response pool.

Conclusions And Recommendations

In order to build up the necessary workforce, local students must be encouraged to enter the health workforce, they must have extensive academic preparation, be trained locally or assisted with the difficult transition to distant training locations and be supported emotionally and financially throughout the process. Family factors must be given extensive attention, as well as the educational preparation that students receive.

Programs in the international literature that have been shown to effectively recruit and retain minority health professions students include aspects such as: tailoring the admissions and training to the cultural needs of a group, beginning recruitment at an early age by recruiters who understand local cultural needs, advertising culturally appropriate programs and support services, and involving native communities in recruitment efforts;^s encouraging the maintenance of attachment to significant people from home;^t financial assistance;^{u,v} transitional support services for college, academic support services for at risk students, math intervention programs, vocational support services, tutoring and student support services;^w family/community encouragement, academic training; mentoring, guidance and role modeling; ongoing support;^x knowledge and skill development, academic and social integration, support and motivation, and monitoring and advisement;¹⁰ and freshman-only advising, orientation courses for credit, monitoring of attendance for at-risk students, targeting minority groups with specific retention plans, and

required tutorial and mentoring activities for certain at-risk students.^y

Based on the current research, the factors that may be of most significance in the areas of Micronesia studied would be getting students interested early through activities that engender family support such as in-school or after school activities that require parental involvement, community health fairs and early mentoring programs. While it is premature to suggest selecting students who have family members in health careers based on this study, the results can be interpreted to indicate that involving family members who have experience in healthcare in mentoring, school-based and community-based activities may increase student success at pursuing such careers based on the

Distance learning, either alone in combination with local face-to-face training or oversight, has been used successfully to provide public health

findings of this study. Strengthening the academic support in English, math, and science is very important to provide the foundation necessary for success in post graduate study of health fields. Providing local training, or providing training at an institution where there are a critical mass of students from Micronesia, a system of mentoring by Micronesian healthcare workers and a location conducive to

staying in touch with family and cultural practices would maximize success.

The Medical Officer Training Program that was present in the Pacific from 1987-1997 had many of these qualities: it was a five-year long training program was designed to be culturally appropriate, locally based, and utilize extensive social support systems.^z Local nursing training programs have educated most of the indigenous nursing workforce in the area. Distance learning, either alone in combination with local face-to-face training or oversight, has been used successfully to provide public health, pharmacy technician and laboratory technician training.^{aa} In order to meet the health workforce needs of the region, other programs like this should be created, and, there must be significant effort given to academic preparation of and social support for students who leave to go to distant training locations.

References

- a Yamada S, Dodd A, Soe T, Chen TH, Bauman K. Diabetes Mellitus Prevalence in Out-Patient Marshallese Adults on Ebeye Island, Republic of the Marshall Islands. *Hawaii Medical Journal*. 2004 Feb; 63:47-53.
- b Kiedrzyński T, Lepers C. Cholera outbreak in Pohnpei and Ebeye/Lae. *Inform'Action* 2001 May (8):11-13.

- c Beatty ME, Jack T, Sivapalasingam S, Yao SS, Paul I, Bibb B, Greene KD, Kubota K, Mintz ED, Brooks JT. An Outbreak of *Vibrio cholerae* O1 infections on Ebeye Island, Republic of the Marshall Islands, associated with use of an adequately chlorinated water source. *Clin Infect Dis*. 2004 Jan 1; 38(1):1-9.
- d WorldHealthOrganization. "Selected health indicators" by country. [Accessed 3/07/05]. Available from: http://www3.who.int/whosis/country/country_select.cfm?path=whosis,inds,country_select&english.
- e Health Professions Shortage Areas Database. Bureau of Health Professions. United States Dept. of Health and Human Services. Washington DC. [Accessed 3/23/05]. Available from: <http://hpsafind.hrsa.gov>
- f Huang G, Taddese N, Walter E. (Synetics for Management Decisions, Inc.). Entry and persistence of women and minorities in college science and engineering education. *Education statistics quarterly*. Washington DC: National Center for Education Statistics. 2000. Report No.: NCES 2000-601.
- g Bourne-Bowie K. Retention depends on new models of student development. *Black Issues in Higher Education*. 2000 Mar 30; 17(3)96.
- h Lopez D. Social cognitive influences on self-regulated learning: the impact of action-control beliefs and academic goals on achievement-related outcomes. *Learning Individual Differences*. 1999, 11(3): 301-318.
- i Monhardt R. Fair play in science education: Equal opportunities for minority students. *The Clearing House*. 2000; 74(1):18-21.
- j Maton K, Hrabowski F, Schmitt C. African American college students excelling in the sciences: College and postcollege outcomes in the Meyerhoff scholars program. *J of Research in Science Teaching*. 2000; 37(7):629-654.
- k Goyette K, Xie Y. (Grant [W.T.] Foundation. New York, NY; National Science Foundation, Arlington, VA). Educational expectations of Asian American youth: Determinants and ethnic differences. *Research Reports*. Ann Arbor (MI): Population Studies Center, University of Michigan; 1997 Jun. Report No.:PSC-97-396.
- l Ferreira M. Gender differences in graduate students' perspectives on the culture of science. *J of Women and Minorities in Science and Engineering*. 2003; 9:119-135.
- m Trusty J. Effects of high school course taking and other variables on choice of science and mathematics college majors. *J of Counseling and Development*. 2002 Fall; 80:464-474.
- n O'Brien V, Martinez-Pons M, Kopala M. Mathematics self-efficacy, ethnic identity, gender, and career interests related to mathematics and science. *J of Educational Research*. 1999 March/April;92(4):231-6
- o Cooper C, Cooper R, Azmitia M, Chavira G, Gullatt Y. Bridging multiple worlds: How African America and Latino youth in academic outreach programs navigate math pathways to college. *Applied Developmental Science*. 2002; 6(2):73-87.
- p Harrigan R, Gollin L, Casken J. Barriers to increasing Native Hawaiian, Samoan and Filipino nursing students: Perceptions of students and their families. *Nursing Outlook*. 2003 Jan/Feb; 51(1): 5-30.
- q Midlands Technical College, Columbia, SC. Black experience in higher education grant. *Minority Student Success Study*. Clemson University (SC): Houston Center for the Study of the Black Experience in Higher Education. 1992 April 15. Reproduction supplied by EDRS database.
- r Nauta MM, Epperson DL, Kahn JH. A multiple-group analysis of predictors of higher level career aspirations among women in mathematics, science and engineering majors. *J of Counseling Psychology*. 1998; 45(5):483-496.
- s Thomason T, Thurber H. (National Institute on Disability and Rehabilitation Research, Washington, DC). Strategies for the recruitment and retention of Native American students. Executive Summary. Flagstaff (AZ): Northern Arizona University, American Indian Rehabilitation Research and Training Center. 1999. Project D-9. ISBN: 1-888557-84-2.
- t Just HD. Minority retention in predominantly White universities and colleges: The importance of creating a good "fit." Austin (TX): St. Edwards University; 1999 Dec.
- u Georges A. Keeping what we've got: The impact of financial aid on Minority Retention in engineering.

- Hispanic Times Magazine. 2000 Oct/Nov; 23(5)33-46.
- v Hagedorn L, Tibbetts K, Moon H, Lester J. Factors Contributing to College Retention in the Native Hawaiian Population. PASE working paper 03-04:9. Kamehameha Schools. Honolulu (HI): [cited 3/4/04, updated 2003]. Available from: http://www.ksbe.edu/pase/pdf/Reports/Post-graduation/03_04_9.pdf
- w Minority Achievement Report. Largo (MD): Prince George's Community College. Office of Institutional Research and Analysis; 1999. Report No.: BT99-3.
- x Rami J, Hansberry A. Educating minority students for the health professions: Taking a quantum leap to meet the challenge. *Education*. 1994; 115(1):80-86.
- y Glenn G. The retention of Black male students in Texas public community colleges. Unpublished manuscript, (ED457890) (2001).
- z Finau S. Appropriate health workforce for sustainable development in the Pacific. *Pacific Health Dialog*. 1997; 4(1):143-153.
- aa Dever G, Finau S, McCormick R, Kuardei S, Withy K, Yano V, Palafox N, Ueda M, Peiranotazzi S, Pretrick E, Ngaden V, Durnand A. In country and community-based postgraduate family practice training for Micronesian physicians-the Palau AHEC: a collaborative effort. *Pacific Health Dialogue*. 2002;9(1)141-5.