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**Rural Medical Scholars Program:
Filling the Gap for Health-Care and Public Health Leaders in Mississippi**

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The Rural Medical & Science Scholars program aims to help rising high school seniors determine if they want to pursue health-related careers. The program shapes students' interest in and understanding of medicine, health-related disciplines, and other science, technology, engineering, and mathematics (STEM) fields. The program combines didactic, observational, and practical learning during a summer semester. Participants earn seven college credits to jumpstart a health or STEM career. We report on descriptive statistics since the program's inception in 1998. The program has matriculated 401 students, of whom approximately 71% have chosen health-related careers in nursing, physical or occupational therapy, dentistry, pharmacy, public health, or medical research. Others are pursuing science-based careers in chemical, biological, or mechanical engineering; information technology; and science-based educational fields. The scholars learn independence and soft skills such as time management, study skills, effective communication, relationship-building skills, and critical thinking. These skills will benefit them in their academic and professional careers. The program has been successful in promoting medical and STEM-related fields while, at the same time, helping to fill the gap for health-care and public-health leaders in Mississippi.

Keywords: workforce, public-health infrastructure, physician shadowing, high school career

Introduction

The Mississippi State University (MSU) Extension Service provides early experiences to rising high school seniors in an effort to fill gaps in the number of rural health-care providers. MSU Extension has a history dating to 1914 as part of the Cooperative Extension Service, which is associated with the land-grant university system. In addition to mission areas in agriculture and natural resources, Extension addresses family and consumer sciences (FCS), 4-H youth development, and community resource development (CRD). The need for more health-care providers, which is a perennial issue in Mississippi, sits at the intersection of those FCS, 4-H, and CRD program areas. With additional health-care providers and public health leaders, Mississippi would be better positioned to address its last-place status in health outcomes (United Health Foundation, 2017).

In 1998, MSU Extension began offering the Rural Medical Scholars (RMS) program in response to Mississippi's low number of physicians per capita. Additional health-care providers are needed, given that Mississippi has 6.4 active primary-care physicians per 10,000 population, which is below the national average of 9 physicians per 10,000 population (American Association of Medical Colleges, 2017). The primary goal of RMS has been to "grow local docs" by identifying competitive rising high school seniors interested in the field of medicine. The program has been offered for 18 years since 1998; in 2008 and 2009, funding was suspended during the Great Recession.

RMS scholars are routinely admitted to MSU for one summer term, during which they earn seven pre-medicine college credits; shadow health-care providers; and engage in workshops emphasizing preventive medicine, health-behavior change, and professional development. The collective experiences in RMS help participants solidify an undergraduate focus on pre-medical science. Those students who remain on the pre-medical science track contribute to a change in economic and social outcomes in rural areas. According to a national report (American Medical Association, 2018), each physician in Mississippi contributes an average total of \$1.8 million in economic output to their community or region.

RMS funding has originated from several sources during the program's history (Carew, Cossman, & Sansing, 2011). From 1998 to 2006, a United States Department of Agriculture/Cooperative State Research, Education, and Extension Service grant supported RMS. This funding assured recruitment from the state's 15 community college regions to maintain an equitable geographic disbursement of scholars. Since this federal funding ended in 2017, funding sources have included the Mississippi Institute for the Improvement of Geographic and Minority Health, Mississippi State Office of Rural Health, Office of the Provost at MSU, Appalachian Regional Commission, and designated donations from the Mississippi Rural Healthcare Association, Mississippi Rural Physicians Scholarship Program, and

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CREATE/Wellspring Toyota. For the last 6 years, MSU Extension has been the primary program sponsor.

Methods

Theoretical Models Informing Program Development

Theoretically driven design helps ensure the success and sustainability of programs like the RMS program. Toward that end, program staff have identified the Theory of Reasoned Action/Planned Behavior (TRA/TPB) as a useful model for organizing and explaining components of RMS's development, evaluation, and refinement (Ajzen & Driver, 1991).

The TRA/TPB defines the links between beliefs, attitudes, norms, intentions, and behaviors. The program takes into account that scholars' knowledge, learned attitudes, beliefs, and aspirations change throughout the program and that scholars develop a positive attitude toward rural medical care. Within the TRA/TPB model, attitudes drive intent, and intent is believed to drive behavior.

Program Components and Curriculum

Recruitment and enrollment. Historically, RMS participants have been recruited from across Mississippi via press releases, social media, and radio and web-based marketing. RMS program staff send materials to high school counselors and health-science program coordinators who share program information with rising high school seniors. Additionally, MSU Extension agents and partnering organizations share the recruitment materials with potential program applicants. Applicants submit a biographical statement including academic performance and out-of-school activities, and essays detailing their interest in RMS. Scholars are selected by a blind-review panel using a rubric for the scoring process.

Counselors and tutors. RMS staff select counselors who serve as mentors and reside with the scholars in the dorms throughout the summer term; staff also hire tutors who facilitate mandated study sessions to reinforce good study habits, time management, and successful completion of coursework.

On-campus living. Scholars live in a residential dorm at MSU during the week and return home on weekends. Scholars depart campus on Friday afternoons and return on Sunday evenings to resume the program. This experience helps scholars prepare for life as college students.

Orientation. Before classes begin, scholars attend a 3-day orientation, which includes multiple workshops focused on communication skills, teamwork, study skills, and critical thinking. Individual topics relevant to the life of a physician are also presented during the workshop. Over the past 2 years, additional workshop components were added on the topics of preventive medicine and health-behavior change.

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Academic coursework. Scholars enroll in introductory biology (with lab) and a sociology course taught by MSU faculty. The didactic courses are taught in the morning, and the biology lab takes place in the afternoon. At the end of the program, which is a 4-week summer session, scholars earn seven college credits. Both courses meet pre-medicine curriculum requirements for a medical career. Most scholars perform well in the classroom, which is a positive indicator that they will do well in medical or professional school. The experiential/observational and experiential/practical workshops are in addition to the didactic seven hours of coursework. Additional learning experiences include shadowing physicians, Junior Master Wellness Volunteer training, visiting the University of Mississippi School of Medicine, and participating in a video documentary review and reflection, Scholars in the Kitchen, and Scholars in the Lab. RMS is a rigorous and intensive program; however, scholars continually report that the program helped them answer that all-important question, “Is medicine the career choice for me?”

Shadowing. Scholars shadow primary-care physicians and a limited number of specialists. Shadowing gives scholars the opportunity to experience the day-to-day work of a physician and offers communication skill-building in a professional setting. Shadowing is a critical component to the program’s success. Scholars finish with 12 to 15 hours of physician shadowing experiences, which boosts their total number of hours over many of their peers when applying for medical school.

Junior Master Wellness Volunteer program. Scholars began training and earning certification as Junior Master Wellness Volunteers in 2016. This training enables them to return to their communities and provide accurate health information to promote healthy choices and lifestyle changes. Each scholar is required to earn at least 24 hours of community service over the following academic year. This certification helps enhance scholars’ résumés for professional health-care careers. Scholars form relationships with their local MSU Extension agents, who assist with community-service projects. The curriculum features a volunteer component, a social media component, and a curriculum modified from the University of Mississippi Medical Center’s Community Health Advocate program. Additional modules relevant to school-based issues and a toolkit for carrying out community-action projects are also included in the curriculum.

Visit to academic medical center. Additionally, scholars visit the University of Mississippi School of Medicine. The visit includes an interactive question-and-answer session with the dean of admissions to gain insight on future admission to medical school. They visit with primary-care physicians and hear personal stories of their journeys into medical school. Scholars also engage in medical-simulation activities that introduce them to the rigors of physicians’ work.

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Video documentary review and reflection. Scholars review two video documentaries, *MD: The Making of a Doctor* (1987) and *Doctors' Diaries* (2009), and work in assigned teams to reflect on the lives of a variety of physicians through their medical-school and residency experiences and into their careers and personal lives. The activity allows scholars to imagine themselves in their chosen field and, at the end of RMS, answer the question, “What have you learned about becoming a physician, and what does it mean to you?” They provide written reflections and deliver oral presentations to their peers as part of this assignment.

Scholars in the Lab. This is a 1.5-hour experiential/practical learning experience that provides a tour of the MSU College of Veterinary Medicine. This experience includes an overview of the One Health concept, which refers to the commonalities between human and animal health. Faculty at the College of Veterinary Medicine teach a hands-on workshop using pigs' feet to teach three types of suturing skills.

Scholars in the Kitchen. This observational/practical learning workshop emphasizes the connection between nutrition and overall health. Scholars provide an ingredient list and recipes for the preparation of a nutritious evening meal and are required to plan using a designated budget. Scholars determine whether to prepare one large meal for everyone or to work in small groups to prepare group meals. This experience teaches cooking skills, teamwork, and communication skills. Scholars can use the skills obtained in this workshop to prepare nutritious meals in their dorms during the program.

Social media connections. Scholars exchange phone numbers and connect via social media and group-texting platforms during the first week of the program. During orientation, many of the activities are strategically designed to promote interaction and group bonding. The social-media and phone-based communication approaches provide opportunities for the group to engage and further develop relationships. Counselors and scholars report staying connected after the program on GroupMe, Facebook, and other platforms.

Evaluation Methods

As part of ongoing evaluation efforts, scholars continually respond to didactic, experiential/observational, and experiential/practical learning experiences through both written, quantitative evaluation and qualitative reflections. Reflective learning is a mechanism that allows the learner to think back about the experience by reflecting on words and feelings that bring clarity to concepts taught, help generate new knowledge and ideas, and allow explanation of ideas to someone who was not present. Thus, scholars are required to submit reflection papers on various components of the program. To make the activity more challenging and competitive, communications experts review the documents and award first, second, and third place for the best papers. Students choose one reflection to share at the end of the program celebration dinner,

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when awards are presented. They also can use this document to share about their experiences during interviews for professional or graduate school.

Participants complete evaluations to assess program satisfaction and intention to pursue health-care careers. The evaluation component features four primary questionnaires administered throughout the program. The initial questionnaire is administered as a pre-test to evaluate scholars' baseline knowledge and expectations for the program. A second questionnaire is used to evaluate various presenters and presentations. The third questionnaire is administered for each shadowing experience. A final questionnaire is administered at the end of the program that summarizes the experience as a whole.

Analysis

As noted previously, RMS program staff maintain records of participants' county of origin, as well as their progress through college and post-graduate studies, including medical or other professional school. Staff also record demographic data about the participants and report on univariate statistics. Furthermore, staff compile their reflective journals and responses to components of the program and conduct open coding and thematic analysis of the assignments. Two coders analyze the data and compare themes for consistency and agreement. In particular for this manuscript, we report on results from the question, "What was the greatest benefit you personally gained from participating in the program?" Additionally, program staff maintain ongoing evaluation with participants through social media. The Mississippi State University Institutional Review Board has reviewed and approved the evaluation efforts of the Rural Medical Scholars program.

Results

Description of Scholars

Since the program's inception, a total of 401 scholars have participated in the program (Table 1). Of these, 157 (40%) were males and 244 (60%) were females. In addition, 103 (26%) participants represented minorities; specifically, through 2018, participants have included 15 Asian males; 23 Asian females; 22 Black males; 33 Black females; 5 Hispanic males; and 5 Hispanic females. Scholars have come from 67 of Mississippi's 82 counties (Figure 1). Forty-six scholars have completed or are actively enrolled in medical school. Of these, 36 are currently practicing physicians (residency or private practice). In addition, 29 are in primary care and 15 are practicing in Mississippi. Eighty-two scholars have yet to complete college.

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Table 1

Number of Rural Medical Scholars Since 1998

Number of scholars since 1998	401
Males	157 (39%)
Females	244 (61%)
Minorities	103 (26%)
Asian males	15
Asian females	23
Black males	22
Black females	33
Hispanic males	5
Hispanic females	5
Number of counties represented	67

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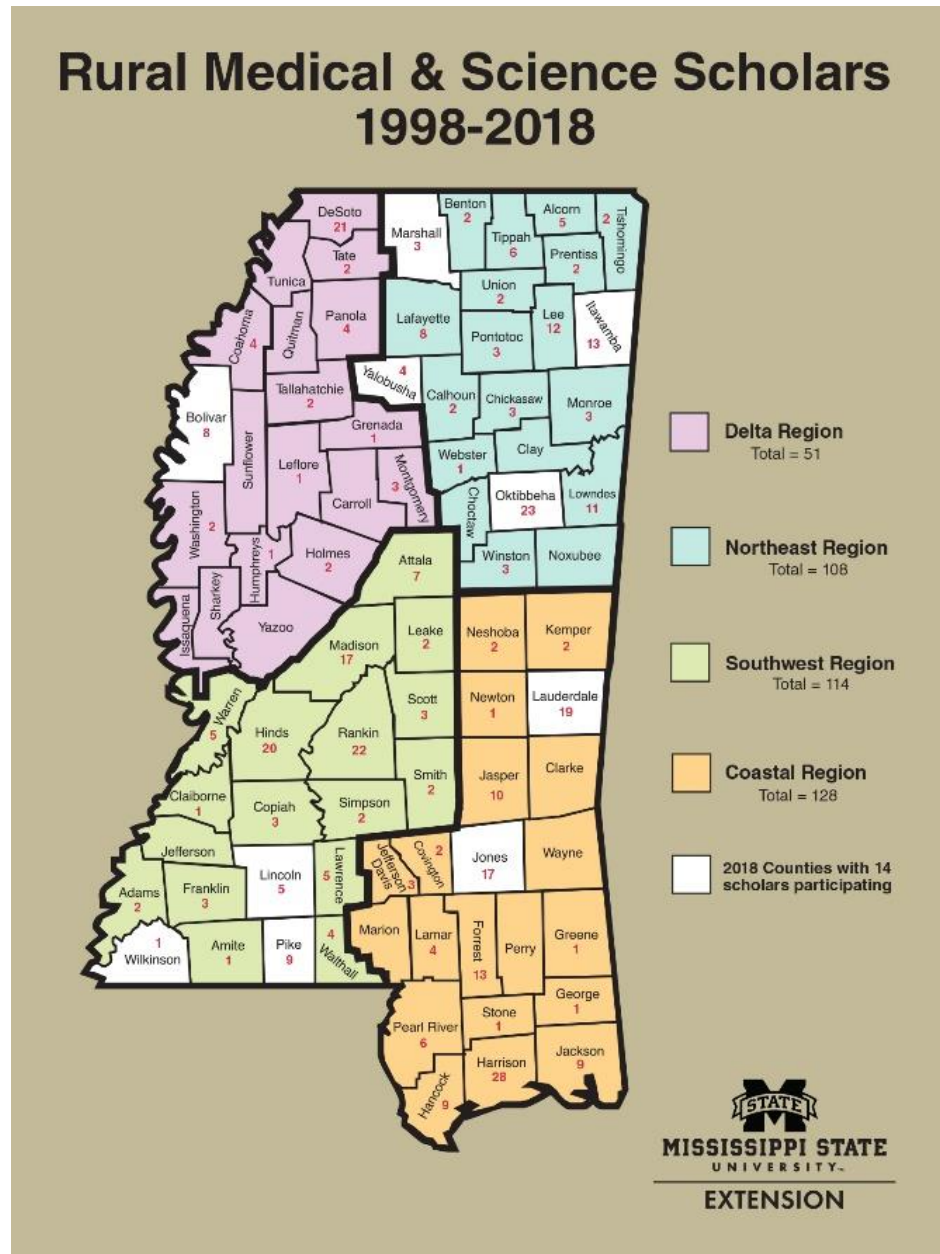


Figure 1. Rural Medical Scholars 1998–2018 participants’ home counties.

Follow-up evaluation shows that 80% of former RMS medical-school graduates entered primary-care residency programs and 17% chose family medicine as their area of specialty. In addition, while 26% of all participants are from minority races/ethnicities, 30% of RMS scholars who have gone to medical school are from minority races/ethnicities, suggesting that our program is providing an important boost for minority scholars. Furthermore, approximately 71% of the scholars are currently studying for or engaged in other health-related careers such as nursing, pharmacy, dentistry, physical or occupational therapy, counseling, medical research, and public

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health. Others are pursuing careers in mechanical, biological, or chemical engineering; technology; or math professions. Only a small number (less than 10%) of scholars decide to pursue careers outside of the sciences.

Qualitative Impact Assessment

At the conclusion of each RMS year, scholars are asked, “What was the greatest benefit you personally gained from participating in the program?” Their responses, combined with informal follow-up assessment, indicate the most important aspects of the program are the social networks scholars build, the independence and soft skills they develop, and the shadowing they experience.

Social networks. Scholars consistently report meaningful relationships built with other scholars and their counselors. Some of them have attended the same college and even roomed together. They often find themselves attending the same medical schools and stay connected for many years. Scholars and counselors report that the dynamic established during RMS continues and that scholars contact their former counselors for advice; these counselors act as mentors throughout scholars’ college, medical school, and residency years.

Independence and soft skills. Scholars also comment that, because they have the opportunity to earn seven college credits and experience college life a year early, they develop a sense of independence and learn time management, study skills, and critical thinking. They also learn effective communication skills and have daily opportunities to implement them with program staff, peers, and course faculty.

Value of shadowing. The shadowing component is overwhelmingly a highlight of the program; scholars learn from and enjoy these real-life experiences. Shadowing, coupled with the visit to the University of Mississippi School of Medicine, make a medical or other health-care career seem more achievable. This visit is often reported as pivotal for scholars’ choosing medicine or choosing another career.

Overall program themes. Following are quotes from RMS alumni that represent key themes of the overall program.

“RMS solidified my interest in medicine, specifically primary care. You could say that, without RMS, I would not be where I am today!”

“This program has allowed me to realize that there are far more options for careers in healthcare than I could have ever known. RMS has provided me with opportunities of a lifetime, endless resources, and the motivation to pursue my dreams of making a difference in the lives of others.”

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“RMS began my interest in a career in the medical field and launched my trajectory into my current career as a quality engineer, ensuring medical devices meet regulatory requirements for the safety of the patient.”

“Those who can, should. RMS showed me that I CAN.”

Discussion and Conclusions

The Rural Medical Scholars program has helped high school seniors determine if they want to pursue health-related careers. As noted previously, the theory of planned behavior/ theory of reasoned action drove development and evaluation of this program. The theory notes that intention predicts behavior, and this program helps students solidify their intention regarding pursuit of medical school. They also learn life skills such as teamwork, building relationships, community service and engagement, and self-efficacy related to performing various tasks. A social media network helps keep the group connected and, therefore, reinforces various normative beliefs regarding the attainment of a medical education among the group after completing the RMS program.

The Rural Medical Scholars program, which could be replicated in other states, may help address health-care workforce shortages across the United States. RMS expanded its scope and name in 2018 to Rural Medical & Science Scholars. The program continues to focus on “growing local docs” but offers additional experiences in science, technology, engineering, and mathematics (STEM), as well as other opportunities in the health-care field. Approximately 71% of the scholars have chosen some type of health-related career, while other scholars have indicated an interest in or pursued other STEM careers. The expansion of the program’s vision will help ensure a strong and passionate workforce for the long-term goals of improving access to healthcare and improving Mississippi’s science-based economy.

The MSU Rural Medical and Science Scholars program has the ability to produce locally educated physicians and perhaps scientists specializing in health-related fields. Future research should report on the outcomes of scholars who do not go into medical or health-care fields. Researchers should also track those scholars who become health-care providers but do not practice in rural settings.

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