

## Additional file 1: Evaluated financial-incentive programs

Program name	Location	Period	Objective	Target group	Definition of underserved area	Financial incentive and obligation	Evaluation studies	Other references
Commonwealth Fund Medical Undergraduate Scholarship Program	Massachusetts, Mississippi, Tennessee, US	1930-1944	“[T]o alleviate medical shortages in rural areas”	Undergraduate medical students attending medical school at Tufts, Tulane, or Vanderbilt University	Rural communities with a population of 5,000 or less (subsequently raised to 10,000 or less)	<p><i>Service-requiring scholarships for medical students:</i></p> <p>Total of USD 1,300 per year over 4 years (between 1930 and 1944; amount equivalent to year-2000 USD 13,405 in 1930 and 12,719 in 1944).</p> <p>In return, the students agree to spend not less than 3 years in practice in an underserved area in their state of origin.</p>	Fitz et al. 1977 [1]	N/A
11 US state service-requiring scholarships and service-option educational loan programs	Arkansas, Georgia, Illinois, Iowa, Kentucky, Minnesota, North Carolina, North Dakota, South Carolina, Virginia, West Virginia, US	Programs started between 1942 and 1968	To increase the number of physicians practicing in underserved areas	Medical students in the respective US state	Different definitions of underserved area (town with population size below a certain threshold, rural community, rural area, “area of critical need”, anywhere in the state)	<p><i>Service-requiring scholarships and service-option educational loans for medical students:</i></p> <p>Between USD 1,000 and 2,775 per year for a period of two to four years (in 1970; lower amount equivalent to year-2000 USD 4,438, higher amount equivalent to year-2000 USD 10,097).</p>	Mason 1971 [2]	N/A

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North Carolina Rural Loan Program	North Carolina, US	Since 1945	“[T]o help smaller communities to obtain professional services”	Students of medicine, dentistry, pharmacy and nursing	“[A]ny town or village having less than 2,500 population according to the last decennial census, or area outside such towns or villages, or area approved by the Medical Care Commission that is considered to meet the spirit and intent of the student loan program”	<p><i>Educational loans with service requirements for students:</i> USD 1,600 per year for unmarried students (in 1963; amount equivalent to year-2000 USD 9,000) and USD 1,900 for married students (in 1963; amount equivalent to year-2000 USD 10,687).</p> <p>For each year the loan is received, the students agree to practice in an underserved area for one year. The loans bear an interest rate of 2%, beginning at the time the loan is advanced. The loans are repaid in monthly installments of 2% of the total amount borrowed, commencing six months after start of practice.</p>	Bradbury 1963 [3]	N/A
Arizona Medical Student Exchange Program	Arizona, US	Since 1953	“[T]o increase the number of graduating physicians who will return to practice in Arizona”	Arizona medical students	Any area in Arizona	<p><i>Payments to medical schools to reduce students' tuition:</i> USD 2,000 (in 1953; amount equivalent to year-2000 USD 12,899), raised to USD 6,000 (in 1977; amount equivalent to year-2000 USD 17,050).</p> <p>For each year the scholarship is received, the students agree to practice two years (1953-1957) or one year (after 1957) in Arizona.</p>	Navin and Nichols 1977 [4]	N/A

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Ontario Under-served Area Program (UAP)	Ontario, Canada	Since 1969	To increase the number of physicians per population in underserved areas in Ontario	Canadian physicians and medical students	Designation of an area as underserved area decided by a committee composed of members of the MoH, based on multiple factors: “[n]umber of doctors in the area” and “their age and health”, “type and amount of practice”, demographic profile of the population, “[s]ocioeconomic status of the area”, “[l]ocal demand for medical services”, “[a]vailability of adequate housing and office facilities for physicians”, and “[h]ealth needs and resources” [5]	<p><i>Service-requiring scholarships for medical students:</i> CAD 5,000 per year (in 1987; amount equivalent to year-2000 USD 5,921).</p> <p>For each year the scholarship is received, the students agree to spend one calendar year in general practice in an underserved area after completion of internship.</p> <p><i>Direct financial incentives for physicians:</i> CAD 10,000 per year served in an underserved area for a maximum of four years (between 1980 and 1988; amount equivalent to year-2000 USD 17,591 in 1980 and year-2000 USD 11,279 in 1988).</p>	Bass and Copeman 1975 [5]; Anderson and Rosenberg 1990 [6]	[7]

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Jichi Medical University (JMU)	Japan nationwide	Since 1972	“[T]o produce rural doctors and distribute them nationwide” [8]	All physicians enrolled in JMU	Rural areas of Japan. The rural areas to which JMU graduates are sent are determined by each of Japan’s 47 prefectures, “considering the demand-supply balance of physicians” [8].	<p><i>Service-requiring scholarships for medical students:</i></p> <p>Full scholarships cover “tuition, entrance and equipment fees and living expenses for the 6 years of study at JMS” [9].</p> <p>In return, participants “are committed to working for medical institutions in their home prefecture for 9 years after graduation. ... The 9-year obligation usually includes 3 years of post-graduate training and 6 years of rural dispatch (ie, duty)” [10].</p>	Inoue et al. 1997 [9]; Inoue et al. 2007 [11]; Matsumoto et al. 2008 [10]; Matsumoto et al. 2008 [8]; Matsumoto et al. 2008 [12]	N/A

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National Health Service Corps (NHSC)	US nationwide	Since 1972 (scholarships)  Since 1987 (loan repayments)	To increase the number of physicians and other health professionals in federally designated Health Professional Shortage Areas (HPSA)	Students enrolled in allopathic or osteopathic medical schools, family nurse practitioners, nurses, midwives, physician assistants, dentists	HPSA status can be assigned to areas, population groups, and facilities. HPSA status is assigned taking into account the practitioner-to-population ratio, availability and accessibility of clinicians in adjacent areas, indicators of need (such as infant mortality) and capacity (such as poverty levels) [13]	<i>Service-requiring scholarships for students:</i> Full scholarships covering tuition, fees, and “other reasonable educational expenses, such as books, supplies, and equipment” [13].  For each year the scholarship is received, the students agree to serve one year at a location designated as HPSA, with a minimum commitment of two years.  <i>Loan repayment programs for physicians:</i> Maximum repayment of USD 25,000 per year for a required initial two-year contract (in 2007; amount equivalent to year-2000 USD 20,336). One year amendments for a maximum of USD 35,000 per year (in 2008; amount equivalent to year-2000 USD 28,470).	Woolf et al. 1981 [14]; Stamps and Kuriger 1983 [15]; Brown et al. 1990 [16]; Stone et al. 1991 [17]; Pathman et al. 1992 [18]; Pathman et al. 1994 [19]; Pathman et al. 1994 [20]; Pathman and Konrad 1996 [21]; Rosenblatt et al. 1996 [22]; Cullen et al. 1997 [23]; Xu et al. 1997 [24]; Xu et al. 1997 [25]; Singer et al. 1998 [26]; Rabinowitz et al. 2000 [27]; Rabinowitz et al. 2001 [28]; Mofidi et al. 2002 [29];	[13, 30]

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							Brooks et al. 2003 [31]; Porterfield et al. 2003 [32]; Probst et al. 2003 [33]; Holmes 2004 [34]; Holmes 2005 [35]; Pathman et al. 2005 [36]; Pathman et al. 2006 [37]; Rittenhouse et al. 2008 [38]	
Scholarship for Indian students in health sciences	Arizona, Utah, Colorado, New Mexico, US	Since 1972	To supply health manpower to the Navajo Indian Reservations and immediately adjacent communities	Indian medical students	Navajo Indian Reservations and immediately adjacent communities	<i>Service-requiring scholarships for medical students:</i> Ranging from USD 650 to 11,000 per year (in 1980; lower amount equivalent to year-2000 USD 1,358 and higher amount equivalent to year-2000 USD 22,988).	Weiss et al. 1980 [39]	N/A

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Oklahoma Rural Medical Education Scholarship Loan	Oklahoma, US	Since 1975	“[T]o increase the number of practicing physicians in underserved and rural areas” (Holmes and Miller 1985)	Osteopathic and allopathic medical students	Rural communities in Oklahoma	<p><i>Service-requiring scholarships for medical students:</i></p> <p>USD 15,500 per year over four years (in 2008; amount equivalent to year-2000 USD 12,202).</p> <p>For each year the scholarship is received, the students agree to practice one year in a rural community in Oklahoma (after residency in a primary care specialty).</p>	Holmes and Miller 1985 [40]; Lapolla et al. 2004 [41]	[42]
NHSC Indian Health Service Corps US state service-requiring scholarships State loan repayment programs Practice and hospital-sponsored direct financial incentives	US nationwide	Pro-grams operating in the 1980s and 1990s	To increase the number of physicians in underserved areas	Medical students, medical residents, and physicians	Different definitions of underserved area	<p><i>Service-requiring scholarships, loan repayment programs, direct financial incentives:</i></p> <p>NHSC: See above.</p> <p>Indian Health Service Corps: Up to USD 20,000 per year (in 2006; amount equivalent to year-2000 USD 17,083).</p> <p>For each year the scholarship is received, the students agree to serve one year in an Indian health program, with a minimum commitment of two years [43].</p> <p>State scholarships: See above and below for examples.</p> <p>State loan repayment programs: See above and below for examples.</p> <p>Practice and hospital-sponsored direct financial incentives: Information on size of incentive and obligation not available.</p>	Pathman et al. 2000 [44]	[43]

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New South Wales Department of Health Rural Resident Medical Officer Program (Cadetship Program)	New South Wales (NSW), Australia	Since 1989	<p>“[T]o help overcome a junior doctor workforce shortage in rural hospitals” in New South Wales</p> <p>“[T]o increase recruitment to the rural medical workforce” (Dunabin et al. 2006)</p>	Australian and New Zealand medical students	Rural hospitals in the NSW Rural Hospital Network	<p><i>Service-requiring scholarships for medical students:</i></p> <p>AUD 15,000 per year over the two final years of medical school (in 2007; amount equivalent to year-2000 USD 12,458).</p> <p>In return, the students agree to serve two of their first three postgraduate years in a rural hospital belonging to the NSW Rural Hospital Network.</p>	Dunabin et al. 2006 [45]	[46]



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Community Scholarship Program (CSP) Health Sciences Scholarship Program (HSSP) Recruitment and Retention Community Program (RRCP) State Loan Repayment Program (SLRP)	West Virginia, US	CSP: 1991-1997 HSSP: Since 1996	“[T]o attract medical students, residents, and physicians to practice in rural and underserved areas” of West Virginia	CSP: medical students from HPSA HSSP: fourth year medical students RRCP: medical residents, physicians and other qualified health professionals SLRP: physicians and other qualified health professionals	HPSA	<i>CSP: service-requiring scholarships for medical students:</i> Amount determined by HPSA community who co-sponsors the scholarship (with additional funding from federal and state funds).  For each year the scholarship is received, the students agree to serve one year in the HPSA where their home is located.  <i>HSSP: service-requiring scholarships for medical students:</i> USD 10,000 (in 2001; amount equivalent to year-2000 USD 9,725)  For the award, the students agree to serve two years in an underserved area.  <i>RRCP: direct financial incentives to medical residents, physicians, and other qualified health personnel:</i> Maximum of USD 20,000 per year for up to six years (in 2001; amount equivalent to year-2000 USD 19,450)  For each year the award is received, the recipients agree to serve one year in an underserved area.  <i>SLRP: direct financial incentives to physicians and other qualified health professionals:</i> Maximum of USD 40,000 (in 2001; amount equivalent to year-2000 USD 38,901) for a commitment to serve two years at a non-profit site in a HPSA. The award can be received twice.	Jackson et al. 2003 [47]	N/A

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20 US state service-requiring scholarship programs 12 state service-option educational loan programs 24 state loan repayment programs 6 state direct financial-incentive programs for medical residents 7 state direct financial-incentive programs for fully trained health professionals	40 US states	All US state programs operating in 1996	“[T]o entice young generalist physicians into rural and medically underserved areas”	Medical students, medical residents, and physicians	Different definitions of underserved area	<p>Across all programs on average USD 14,000 per year of service (in 1996; amount equivalent to year-2000 USD 15,365) (differences between award means of the five program types not significant, <math>p = 0.55</math>).</p> <p><i>Service-requiring scholarships:</i> For each year the scholarship is received, the students agree to serve one year in an underserved area.</p> <p><i>Service-option educational loans:</i> The medical students can either repay the loan at standard interest rates or repay the loan by serving one year in an underserved area per year of receipt of loan.</p> <p><i>Loan repayment programs:</i> Medical residents commit to service in an underserved area in exchange for loan repayment (commitment usually near the end of residency training).</p> <p><i>Direct financial incentives for medical residents:</i> Medical residents commit to service in an underserved area in exchange for the monetary reward (commitment usually at the beginning of the residency).</p> <p><i>Direct financial incentives for fully trained health professionals:</i> Medical residents commit to service in an underserved area in exchange for the monetary reward (commitment usually near the end of residency training).</p>	Pathman et al. 2004 [48]	N/A

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Friends of Mosvold Scholarship Scheme (FOMSS)	Umkhan-yakude district, KwaZulu-Natal, South Africa	Since 1998	To “help integrate graduates into the workforce in the district”	Students from Umkhan-yakude district who have been admitted to a tertiary health care education institution, completed at least 2 weeks of work experience at one of the hospitals in the district, and were selected by a committee of local residents	District of Umkhanyakude	<p><i>Service-requiring scholarships for students admitted to a tertiary health care education institution:</i></p> <p>“Funds for university tuition, books, residence fees and food” [49].</p> <p>For each year the scholarship is received, the students agree to work one year as health professionals in Umkhanyakude district.</p>	Ross 2007 [50]	[49]

USD = United States dollar, CAD = Canadian dollar, AUD = Australian dollar, MoH = Ministry of Health, N/A = not applicable.

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