Supplementary Appendix

Silvestri DM, Blevins MB, Afzal AR, Andrews B, Derbew M, Kaur S, Mipando M, et al. **Medical and nursing students' intentions to work abroad or in rural areas: a cross-sectional survey in Asia and Africa.** *Bull World Health Organ*. 2014;92:750-759.

Table A1: Review of surveys from low and middle income nations assessing medical and/or nursing student intended migration and/or practice location from 2000-mid-2013 *(X indicates "yes, included" whereas blank indicates "not included")*

Author and Reference (footnote)	Outcome* Both int'l and rural-to-urban migration	Geographic Scope† Inter-continental	Inter-national	Respondent Type‡ Both nursing & medical	Both preclinical & clinical years	Methods§ Multi-variable	Study Size‖ No. Countries	No. Classes	Sample Size	Response Rate
Sheikh A, et al.[1]					X		1	6	323	81%
Shankar PR, et al.[2]							1	2	185	93%
Deressa W, et al.[3]	X				X	X	1	5	600	75%
Huntington I, et al.[4]	X					X	1	8	469	85%
Kotha SR, et al.[5] (1)	X					X	1	3	228	74%
Yeganeh-Arani E, et al.[6]	X				X		1	5	205	70%
Saini NK, et al.[7]							1	2	201	N/S¶
Burch VC, et al.[8]	X		X				6	9	990	79%
Johnson JC, et al.[9] (1)	X					X	1	3	302	97%
Imran N, et al.[10]							1	2	275	69%
Ferrinho P, et al.[11]			X		X		3	15	1072	N/S
Blaauw D, et al.[12] (2,3)		X	X			X	3	N/S	1064	75%
Serneels P, et al.[13] (2,4,5)			X	X		X	2	18	492	N/S
Kruk ME, et al.[14] (1,2)						X	1	3	302	97%
Leon BK, et al.[15]						X	1	3	130	96%
de Vries E, et al.[16]	X						1	8	876	67%
Lakhey M, et al.[17]					X		1	3	265	N/S
Nguyen L, et al.[18] (6)	X				X		1	N/S	158	31%
Syed NA, et al.[19]							1	2	217	92%
Serneels P, et al.[20] (2,4,5)				X		X	1	11	309	N/S
Rao NR, et al.[21]							1	2	166	69%
Dambisya YM.[22]	X				X		1	6	364	88%
Our study	**X**	**X**	**X**	**X**	**X**	**X**	**8**	**32**	**3199**	**84%**

NOTES next page

An "X" indicates a feature included in the indicated study, while a blank space indicates a feature not included.

*Study assesses student intentions regarding both international and rural/urban practice locations.

†Study conducted in multiple continents or countries.

‡Study conducted among both medical and nursing students, or among students in both preclinical and clinical class years.

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§Study assesses migration outcomes using multivariable analysis.

‖Where information is available, we list here the number of countries and unique student classes represented by study respondents, the total number of respondents, and the response rate as a percent of total targeted population. Total number of respondents and sample size are as included in analysis, after elimination of incomplete responses.

¶N/S = not specified or information not available for computation.

Footnotes:

(1) Kotha SR, et al.; Johnson JC, et al.; Kruk ME, et al. are derived from a common data source.

(2) Blaauw D, et al.; Serneels P, et al. (2010, 2003); and Kruk ME, et al. assess student intent to migrate indirectly using either discrete choice experiment methodology (Blauuw D, et al.; Kruk ME, et al.) or contingent valuation (Serneels P, et al. (2010, 2003)).

(3) Blaauw D, et al. conducts the only intercontinental survey. Two of the three countries included (South Africa and Thailand) are middle-income nations without WHO-classified 'critical shortages' of health service providers.

(4) Serneels P, et al. (2010) uses 2008 data collected in Rwanda along with 2005 Ethiopian data from Serneels, et al. (2003). Information on study size provided here for Serneels P, et al. (2010) includes both new Rwandan data and older Ethiopian data.

(5) Serneels P, et al. (2003, 2010) survey students in from a wide variety of school types (government, private for-profit, NGO not-for-profit) and regions, without controlling for respondent institution characteristics, country, or year of data collection (2005 vs. 2008) in analysis. A small random sample was taken from each school, accounting for the large number of unique classes studied.

(6) Nguyen L, et al. surveys students from all class years but does not include class year (or preclinical vs. clinical) as a variable in analysis.

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Table A2: Student characteristics in eight-country survey of migration intentions, 2011-2012

Demographic Characteristics	
Degree program *(MV)*	Degree of religiosity ‖
Class year *(MV)*	Maternal tertiary education *(MV)*
Age	Paternal tertiary education
Gender *(MV)*	Number of grandparents with tertiary education
Number of languages spoken conversationally *(MV)*	Relationship status
Primary language *(MV)*	Marital status
Tribe/Ethnicity	Frequency of contact with immediate family
Country(ies) of citizenship*	Frequency of contact with extended family
Country in which majority of childhood was spent *(MV)*	Location of immediate family ‡
Region/Province/State of upbringing †	Location of extended family ‡ *(MV)*
Location of primary school ‡	Immediate or extended family members living abroad
Location of secondary school ‡	Family socioeconomic status *(MV)*
Longest duration spent in a rural setting *(MV)*	Primary means for financing education ¶
Prior foreign travel	Secondary means of financing education ¶
Number of countries visited §	Financial debt expected upon graduation
Longest duration spent abroad §	Degree of concern regarding debt
Number of trips abroad §	Number of expected dependents *(MV)*
Religious affiliation	Type of expected dependents ¤
Career Desires and Intentions	
Pre-matriculation desire for rural career *(MV)*	Likelihood of pursuing further post-graduate training *(MV)*
Pre-matriculation desire for international career *(MV)*	

(MV) Variable was chosen *a priori* for inclusion in multivariable proportional odds model assessing predictors of rural or international work intentions. A total of fourteen variables were included. The number of characteristics selected was computed using the smallest country sample size.[1] *Name(s) of countries in which student holds citizenship. †Name of country region, province, or state in which student spent the majority of his/her childhood. ‡Five location options were provided, ranging from rural village to very large city. An additional option ("outside the country") was included for items assessing family location. §Responses contingent upon student having prior foreign travel. ‖ Five-question item assessing religiosity, derived from validated Duke University Religion Index (DUREL).[2] ¶ Means of financing education include scholarships (with or without service obligation), loan, family or personal savings, other. ¤ Types of expected dependents include spouse, children, parents, siblings, nieces/nephews, aunts/uncles, cousins, grandparents.

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Table A3: International and rural career intentions among medical and nursing students by country, 2011-2012

	Likelihood of choosing international career within 5 years after training*			Likelihood of choosing rural career within 5 years after training*		
	Very Likely	*Neutral †*	*Very Unlikely*	*Very Likely*	*Neutral †*	*Very Unlikely*
Bangladesh, n(%)‡	**146 (34)**	**252 (57)**	**37 (9)**	**97 (22)**	**289 (65)**	**48 (11)**
First year, medical	39 (26)	98 (65)	14 (9)	28 (19)	109 (72)	14 (9)
Final year, medical	37 (24)	96 (63)	20 (13)	37 (24)	98 (64)	18 (12)
First year, nursing	43 (54)	34 (43)	2 (3)	24 (30)	50 (63)	5 (6)
Final year, nursing	27 (52)	24 (46)	1 (2)	8 (16)	32 (63)	11 (22)
India, n(%)	**87 (20)**	**272 (63)**	**73 (17)**	**51 (12)**	**311 (72)**	**70 (16)**
First year, medical	38 (17)	154 (70)	29 (13)	23 (10)	170 (77)	28 (13)
Final year, medical	23 (15)	92 (59)	41 (26)	16 (10)	103 (66)	37 (24)
First year, nursing	17 (50)	16 (47)	1 (3)	12 (35)	20 (59)	2 (6)
Final year, nursing	9 (43)	10 (48)	2 (10)	0 (0)	18 (86)	3 (14)
Nepal, n(%)	**54 (27)**	**135 (67)**	**14 (7)**	**43 (21)**	**140 (69)**	**20 (10)**
First year, medical	29 (27)	69 (64)	10 (9)	27 (25)	72 (67)	9 (8)
Final year, medical	14 (24)	41 (69)	4 (7)	8 (14)	46 (78)	5 (8)
First year, nursing	3 (16)	16 (84)	0 (0)	3 (16)	15 (79)	1 (5)
Final year, nursing	8 (47)	9 (53)	0 (0)	5 (29)	7 (41)	5 (29)
Ethiopia, n(%)	**142 (33)**	**242 (55)**	**51 (12)**	**71 (16)**	**222 (51)**	**142 (33)**
First year, medical	60 (34)	106 (59)	13 (7)	29 (16)	110 (61)	40 (22)
Final year, medical	48 (31)	77 (49)	31 (20)	31 (20)	67 (43)	58 (37)
First year, nursing	18 (36)	26 (52)	6 (12)	7 (14)	20 (40)	23 (46)
Final year, nursing	16 (32)	33 (66)	1 (2)	4 (8)	25 (50)	21 (42)
Kenya, n(%)	**188 (31)**	**346 (55)**	**89 (14)**	**74 (12)**	**342 (54)**	**206 (33)**
First year, medical	87 (26)	198 (60)	47 (14)	38 (11)	203 (61)	91 (27)
Final year, medical	27 (18)	88 (60)	32 (22)	12 (8)	58 (39)	77 (52)
First year, nursing	43 (55)	29 (37)	6 (8)	16 (21)	47 (61)	14 (18)
Final year, nursing	31 (47)	31 (47)	4 (6)	8 (12)	34 (52)	24 (36)
Malawi, n(%)	**97 (25)**	**209 (53)**	**78 (20)**	**100 (26)**	**190 (48)**	**95 (25)**
First year, medical	15 (18)	50 (59)	20 (24)	23 (27)	46 (54)	16 (19)
Final year, medical	14 (27)	29 (57)	8 (16)	3 (6)	31 (61)	17 (33)
First year, nursing	44 (27)	88 (54)	30 (19)	61 (37)	77 (47)	26 (16)
Final year, nursing	24 (28)	42 (49)	20 (23)	13 (15)	36 (42)	36 (42)
Tanzania, n(%)	**102 (29)**	**195 (55)**	**55 (16)**	**56 (16)**	**190 (54)**	**107 (30)**
First year, medical	49 (28)	98 (56)	27 (16)	30 (17)	90 (52)	54 (31)
Final year, medical	30 (24)	72 (57)	25 (20)	12 (9)	73 (57)	43 (34)
First year, nursing	20 (53)	16 (42)	2 (5)	12 (32)	17 (45)	9 (24)

|						
Final year, nursing	3 (23)	9 (69)	1 (8)	2 (15)	10 (77)	1 (8)
Zambia, n(%)	**54 (19)**	**154 (52)**	**84 (29)**	**83 (28)**	**152 (51)**	**59 (20)**
First year, medical	32 (31)	47 (46)	24 (23)	30 (29)	49 (47)	25 (24)
Final year, medical	0 (0)	43 (83)	9 (17)	13 (25)	35 (66)	5 (9)
First year, nursing	22 (21)	55 (51)	30 (28)	32 (30)	55 (51)	20 (19)
Final year, nursing	0 (0)	9 (30)	21 (70)	8 (27)	13 (43)	9 (30)

*Likelihood to choose to work in a rural or international setting within five years after completing training and any service obligations. †Combined responses for slightly likely, neutral, and slightly unlikely. ‡ Row percentages are computed using the number of students with a non-missing value. A total of 43 questionnaires lacked responses regarding international migration intentions, while 41 questionnaires were missing responses regarding rural work expectations.

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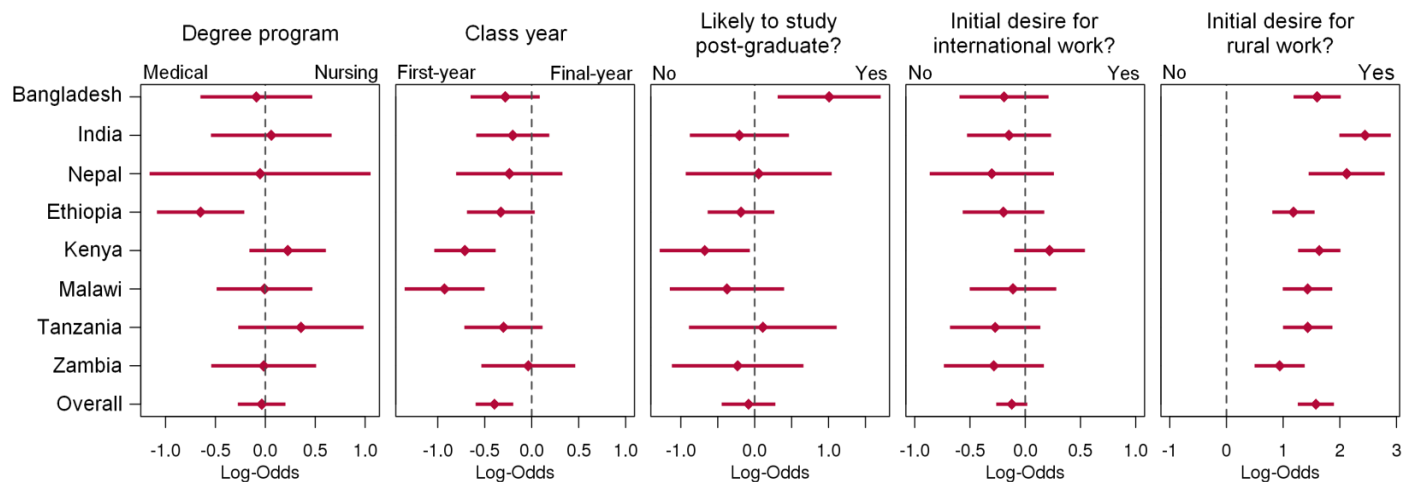
Figure A1: Country-specific likelihood of choosing an international or rural career after training, 2011-2012

(a) Country-Specific Likelihood of Choosing an International Career After Training
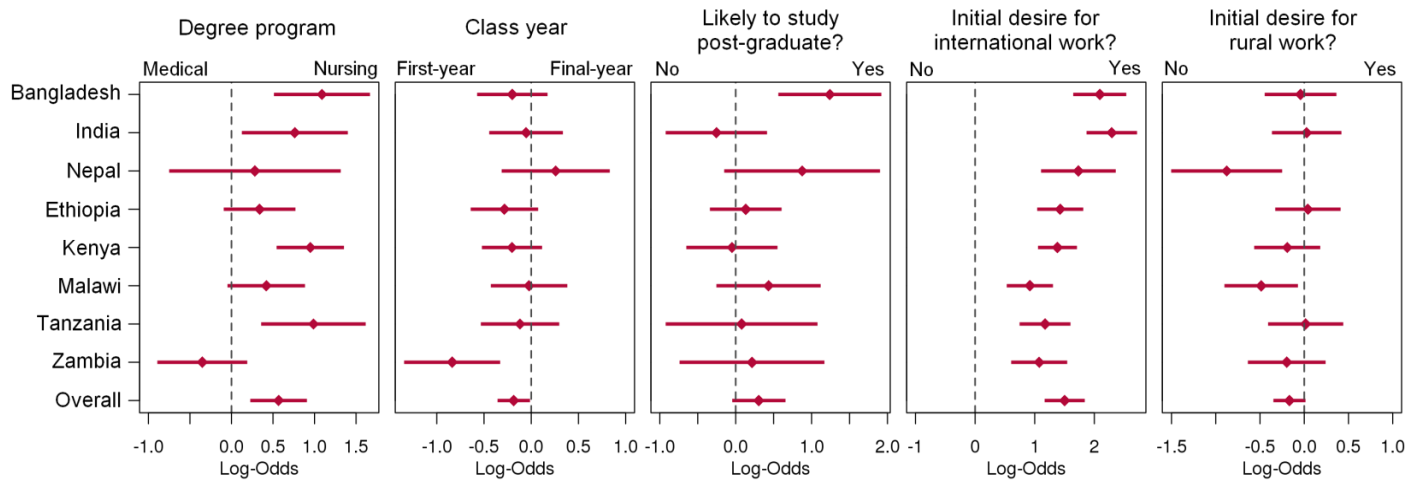
(b) Country-Specific Likelihood of Choosing a Rural Career After Training

Figure Legend:

Country-specific likelihood of choosing (a) an international career after training (i.e., migrating from the country-of-training) or (b) a rural career in the country-of-training. Country and overall comparisons are presented on a log-odds scale, where the dotted equivalence line represents an odds ratio of 1 (equal odds) for each variable depicted. Estimates and 95% CI to the right of the equivalence line indicate higher odds (greater likelihood of choosing international or rural work) for the rightmost variable subgroup (i.e., nursing, final-year, etc.) as compared to the leftmost subgroup (i.e., medical, first-year, etc.); the converse also holds true. Overall estimates presented here are the combined results of country-specific ORs using a meta-analysis approach, and are the natural logarithm of the odds ratios presented in Table 4.