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ORIGINAL SCIENTIFIC REPORT

Increasing and Retaining African Surgeons Working in Rural Hospitals: An Analysis of PAACS Surgeons with Twenty-Year Program Follow-Up

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Abstract

Background African surgical workforce needs are significant, with largest disparities existing in rural settings. Pan-African Academy of Christian Surgeons (PAACS), a primarily rural-based general surgery training program, has published successes in producing rural African surgeons; however, long-term follow-up data are unreported. The goal of our study was to define characteristics of PAACS alumni surgeons working in rural hospitals, documenting successes and illuminating strategies for trainee recruitment and retention.

Method PAACS' twenty-year surgery residency database was reviewed for 12 programs throughout Africa regarding trainee demographics and graduate outcomes. Characteristics of PAACS' graduate surgeons were further analyzed with a 42-question survey.

Results Among active PAACS graduates, 100% practice in Africa and 79% within their home country. PAACS graduates had 51% short-term and 35% long-term (beyond 5 years) rural retention rate (less than 50,000 population).

Conclusion Our study shows that PAACS general surgery training program has a high retention rate of African surgeons in rural settings compared to all programs reported to date, highlighting a multifaceted, rural-focused approach that could be emulated by surgical training programs worldwide.

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Introduction

Meeting the global surgical burden of disease (~30% of total disease burden) requires an increased surgeon workforce [1]. O'Flynn's 2016 study documented 0.53 surgeons per 100,000 population in East and Central Africa with approximately 13% practicing in cities of populations less than 100,000 [2]. Despite the slow increase in surgeon numbers, significant disparity in the *rural* surgeon workforce continues.

The Pan-African Academy of Christian Surgeons (PAACS) established its first program in Gabon in 1997 [3]; and in 1999, the College of Surgeons of East, Central and Southern Africa (COSECSA) was launched in Nairobi, Kenya, as an evolution from the Association of Surgeons of East Africa [4]. Both groups recognized the variable surgeon quality and insufficient numbers produced by university teaching hospitals, desiring curriculum standardization and longer training. COSECSA created a training program involving two sequential certificates through written and oral examinations to assist standardizing surgeon qualifications in the region: Membership of the College of Surgeons (MCS), after 2 years and Fellowship of the College of Surgeons (FCS) after three more years [5].

PAACS is a non-governmental organization (NGO) utilizing mostly rural faith-based hospitals to train surgeons for rural hospital service. Twelve programs in 8 countries, at 11 mission hospitals include general surgery (GS), orthopedics, pediatrics and head and neck. The five-year competency-based curriculum involves close supervision from qualified surgeons, detailed case log database, and systematic teaching of clinical, academic, spiritual and ethical topics. Trainees must be African graduates of recognized medical schools, have a valid medical license in both home and training countries, sign statement of faith and speak English fluently. A five-year service agreement is in exchange for fully funded training, in countries where tuition is often required. The PAACS-COSECSA collaboration includes some joint committee representation and shared resources. Starting in 2007, PAACS progressively gained COSECSA approval for 9 program sites that allows PAACS residents to sit for COSECSA qualification exams. The West African College of Surgeons (WACS) gave partial approval for two of its programs (Cameroon and Gabon).

The global push for rural physician retention has focused on financial incentives, rural exposure, mentorship, recruitment from rural backgrounds, and mandatory public service [6–11]. However, a geographical and primary care publication bias exists, with few studies involving African surgeons in rural locations [1, 12–15]. Pollock and colleagues published PAACS' success in producing rural general surgeons; however, long-term follow-up data of these rural graduates are unreported [16].

The goal of our descriptive study was to use retrospective data and survey analysis to define characteristics of PAACS alumni surgeons working in rural hospitals, documenting successes and illuminating strategies for trainee recruitment and retention.

Materials and methods

Our study included: (1) a review of PAACS' residency database; and (2) a survey to PAACS graduates. IRB approval was obtained through Kijabe Hospital, Kijabe, Kenya, prior to study commencement.

PAACS' residency database provided graduates' information, demographics, and current practice settings. Database included current residents, those who left the program and graduates of 12 PAACS residency programs; only graduates received the survey. Rural was considered as less than 50,000 populations, although worldwide, definitions vary [17–19].

A 42-question survey was developed by African and expatriate surgeons (Appendix A), with 5 internal review questions not included in analysis. The English language survey, including consent, detailed study intentions, non-mandatory response and risks involved, was emailed in September 2017 with a non-responder follow-up email 2 weeks later. PAACS staff internally recorded and de-identified responses prior to analysis.

Primary outcomes of the survey were: likeliness to practice at current location in 5 years, and likeliness to practice rurally. All items were treated as categorical variables except for age. Responses regarding practice motivations were summarized into five categories and further down to three due to similarity in responses. Categorical variables were tested using Fisher's exact test. Results were considered significant for $p < 0.05$. All analyses were conducted using SAS version 9.4 (SAS Institute Inc). When performing data analysis, different totals were used as they varied between topics and accounted for one deceased graduate, those in fellowship training or not in practice.

Results

PAACS started in 1997; as of December 2017, PAACS enrolled 171 residents, 74 current trainees, 30 left the program, and 67 graduated, including 63 general surgeons and 4 pediatric surgeons. All living graduates serve in 20 African countries (Fig. 1). One graduate, after years of GS

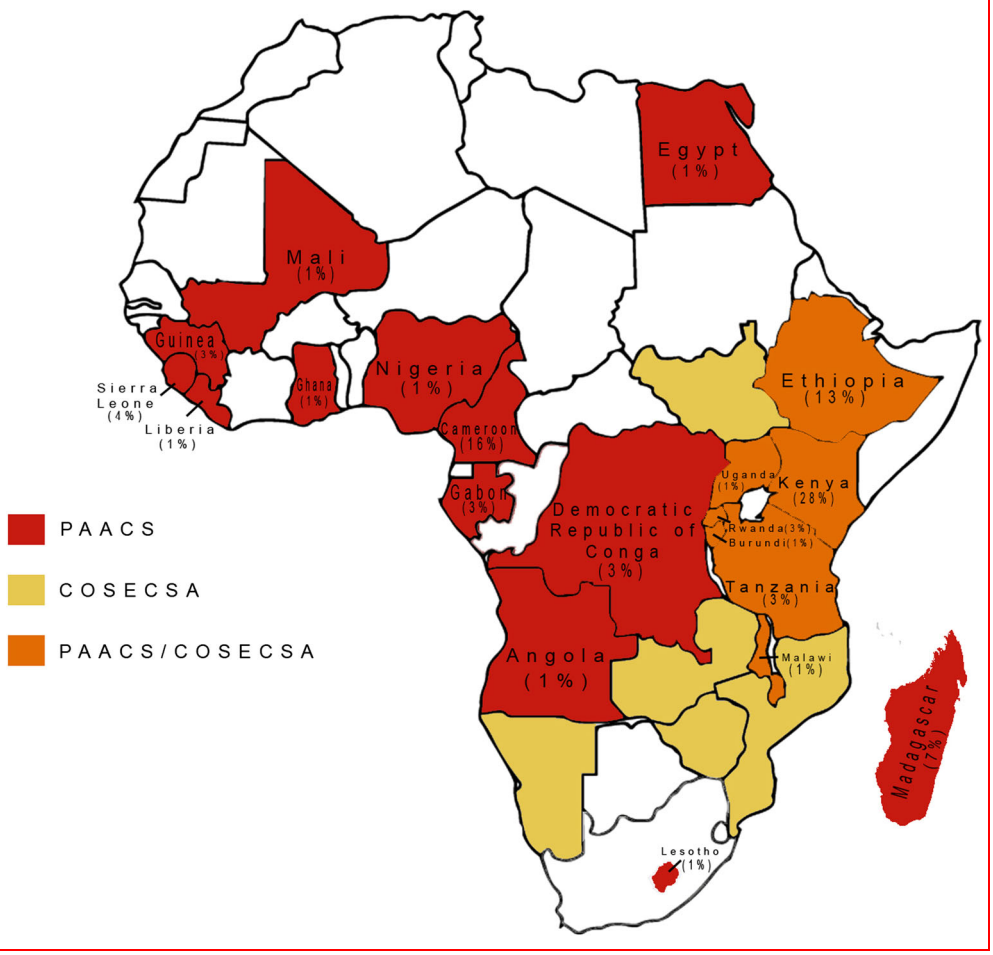

Fig. 1 Location of PAACS graduates', COSECSA region and overlapping countries

Table 1 Demographics of PAACS graduates

	All graduate combined ($N = 67$)	Long-term graduates: in practice >5 years ($N = 20$)
Gender (% male)	59 (88%)	19 (95%)
Practicing in home country	53 (79%)	16 (80%)
Hospital site		
Mission hospital	53 (79%)	15 (75%)
District hospital	9 (13%)	4 (25%)
Unknown	5 (7%)	1 (5%)
Town size		
Rural (<50,000 population)	34 (51%)	7 (35%)
Urban, small (51,000–150,000 population)	5 (7%)	3 (15%)
Urban, large (>150,000 population)	27 (40%)	9 (45%)
Unknown	1 (1%)	1 (< 1%)

service, is currently in fellowship training in UK to serve as a urologist in the same rural African hospital. Of those 171, 94 (55%) were from COSECSA countries. Of the 102 COSECSA FCS qualified general surgeons, from training programs throughout Africa, 31 (30.4%) are PAACS-trained, with additional PAACS members granted qualification by election.

Table 1 shows the demographics of PAACS graduates, revealing both short- and long-term rural retention rates. Among those not practicing in their home country

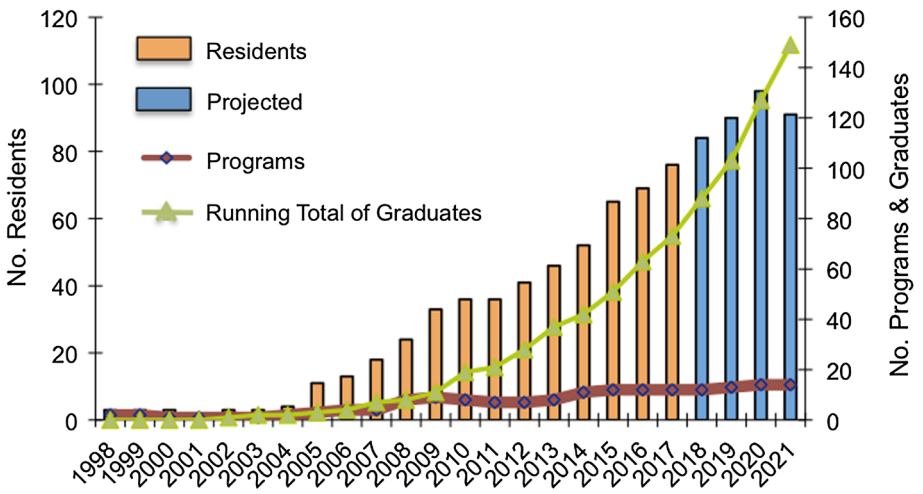

Fig. 2 Timeline of PAACS growth

Table 2 Trainees' primary language in comparing attrition and remediation rates

	N	Attrition rate *n* (%)	Remediated *n* (%)	Successful Remediation *n* (%)
Anglophone	87	15 (17%)	3 (3%)	1 (33%)
Non-anglophone	84	15 (18%)	13 (15%)	11 (85%)
Francophone	44	7 (16%)	9 (20%)	7 (78%)
Arabic	22	2 (9%)	3 (14%)	3 (100%)
Lusophone	3	1 (33%)	1 (33%)	1 (100%)
Amharic	9	3 (33%)	0 (0%)	0 (0%)
Other	6	2 (33%)	0 (0%)	0 (0%)
Total	171	30 (18%)	16 (9%)	12 (75%)

The percentages in this table represent row percentages

(*N* = 14), 57% are from Democratic Republic of the Congo, followed by Ethiopia (14%), Nigeria (14%), Kenya (7%), and Uganda (7%).

Fourteen graduates have completed or are currently involved in specialty training including head and neck, trauma, urology, pediatrics, orthopedics, plastics, and cardiothoracic. PAACS projects to train over 120 surgeons in Africa by 2020 (Fig. 2). Review of resident case logs showed diverse subspecialty training, including general surgery (44%), orthopedics (24%), urology (13%), and pediatrics, plastics, obstetrics/gynecology, neurosurgery.

The average faculty-trainee ratio was 1:1.1 for all program sites. Presently, 42 expatriates and 24 nationals serve as faculty with extensive supplemental volunteer specialists from North America, Europe and Australasia.

Table 2 shows 18% (30/171) overall attrition rate. Reasons for leaving included: poor academic performance (*N* = 10), poor integrity/unprofessional behavior (*N* = 5), change to other specialties (*N* = 5); fraudulent application (*N* = 2), and other (*N* = 8). Most residents (73%) left in the first year. Non-anglophone residents had a significantly higher remediation rate compared to Anglophone residents (15% vs. 3%, $p = 0.0174$). The overall remediation success rate was 75% (12/16). Although training occurs in English, 49% (84/171) of trainees do not consider it their primary language.

Since being allowed to sit for COSECSA examinations in 2008, PAACS GS passage rates for the COSECSA MCS and FCS examinations were overall above average (Table 3), with the majority (>70%) passing both on first attempt. A PAACS graduate was the first COSECSA pediatric surgery fellow, and another was the first GS COSECSA FCS in Ethiopia. From 2012 to 2017, a PAACS trainee was awarded best FCS GS examinee.

PAACS graduate survey: surgeon characteristics

Thirty (45%) PAACS graduates responded to the survey. Table 4 notes the responders' demographics and personal

Table 3 Combined PAACS and non-PAACS FCS passage rates through 2016

	Non-PAACS		
	PAACS	COSECSA	Total
General surgery FCS			
Passage rate	31/33 (94%)	58/71 (82%)	89/104 (86%)
Pediatric surgery FCS			
Passage rate	5/6 (83%)	8/12 (67%)	13/18 (72%)
Combined specialty FCS			
Passage rate*	NA	NA	75/90 (83%)
Total			177/212 (84%)

*Combined passage rate included Non-PAACS COSECSA residents in orthopedics, urology, neurosurgery and plastic surgery

characteristics. Majority of the respondents were male (90%), married (97%) and have children (93%).

PAACS graduate survey: predicting future practice

Table 5 shows four factors that had positive trends impacting likelihood to practice at current location: spouse working outside home, pursuing specialty surgical training, feeling adequately trained, and feeling valued/appreciated by hospital staff and community. Additional analysis found that among urban practicing graduates, 60% of those who feel well trained said they would stay at current location compared to 20% feeling less-trained ($p = 0.2821$). Similarly in rural settings, 36% of those feeling well trained say they would stay at current practice, compared to 0% feeling less-trained ($p = 0.5165$). However, despite observing a difference, there was no statistical significance.

Table 4 PAACS graduate survey responder demographics and responses

Survey responses	*N* responded	*N* (%)
Age, mean (SD)	30	41 ± 8.1
Sex (male)	30	27 (90%)
Married	29	29 (100%)
Has children (≥1 child)	28	26 (93%)
Somewhat or very satisfied with children's education opportunities	28	14 (50%)
Spouse work outside home full/part time	29	17 (59%)
Post medical school training in rural area for over 6 months	30	20 (67%)
Current job in rural location	30	8 (27%)
Average number of patients seen (≥51/week)	30	17 (57%)
Average number of operations performed (≥16/week)	28	11 (39%)
On call "everyday" or "every other day"	29	16 (55%)
Feel somewhat or very adequately trained	30	29 (97%)
Feel somewhat or very satisfied with opportunities for professional development	29	17 (59%)
Feel somewhat or very valued and appreciated by hospital staff and community	29	27 (93%)
Other leadership positions in community (≥1)	29	23 (79%)
Have surgical mentor	29	21 (72%)
Anticipate practicing rurally	30	
No		4 (13%)
≥2 years		6 (20%)
≥5 years		12 (40%)
≥10 years		4 (13%)
Indefinitely		4 (13%)
Anticipate practicing at current location in 5 years	30	
Very likely		11 (37%)
Somewhat likely		11 (37%)
Neutral		6 (20%)
Somewhat unlikely		1 (3%)
Very unlikely		1 (3%)

Table 5 Survey results by likelihood to continue practicing at current location in 5 years

Response (N = 30)	Very unlikely/somewhat unlikely/ neutral/somewhat likely (N = 19)	Very likely (N = 11)	p value
Spouse work outside home (full/part time)	9 (47%)	8 (80%)	0.1261
Likelihood to pursue additional specialty surgical training			0.0384
Somewhat unlikely/neutral	4 (21%)	1 (9%)	
Somewhat likely	12 (63%)	3 (27%)	
Very likely	3 (16%)	7 (64%)	
Feel very adequately trained	11 (58%)	10 (91%)	0.1000
Feel very valued or appreciated by hospital staff and community	8 (44%)	9 (82%)	0.0641

Table 6 Survey results by likelihood to practice rurally long-term

Response (N = 30)	No rural practice long-term (N = 4)	Yes, rural practice for next 2–5 years (N = 18)	Yes, rural practice for next 10+ years (N = 8)	p value
Hometown size				0.6493
<100 k	3 (75%)	6 (33%)	3 (38%)	
100–500 k	1 (25%)	5 (28%)	2 (25%)	
>500 k	0 (0%)	7 (39%)	3 (38%)	
Post medical school training at rural area				0.2635
<6 months	2 (50%)	4 (22%)	4 (50%)	
>6 months	2 (50%)	14 (78%)	4 (50%)	
Satisfied with children educational opportunities (% very satisfied/somewhat satisfied)	2 (50%)	7 (39%)	5 (63%)	0.6677
On call frequency				0.7593
Every day/every other day	3 (75%)	9 (53%)	4 (50%)	
Every third day/every fourth day/every fifth day or more	1 (25%)	8 (47%)	4 (50%)	
Feel adequately trained (% very adequately trained)	3 (75%)	14 (78%)	4 (50%)	0.2797
Feel valued or appreciated by hospital staff and community				0.3284
Neutral/somewhat devalued or appreciated	0 (0%)	1 (6%)	1 (13%)	
Somewhat valued or appreciated	0 (0%)	6 (35%)	4 (50%)	
Very valued or appreciated	4 (100%)	10 (59%)	3 (38%)	
Salary (% > $1000/month)	2 (67%)	11 (69%)	5 (63%)	1.0000

The percentages in this table represent column percentages

Table 6 shows that 70% of those who received more than 6 months of training in rural areas after medical school anticipate practicing rurally in the next 2–5 years, compared to 40% of those with less than 6 months of training, although not statistically significant ([row percentages] p = 0.2635).

PAACS graduate survey: motivations

Ironically, survey responders motivated by "impact the surgical disparities" are more likely to report no anticipation to practice rurally long term compared to those with other motivations (60% vs. <5%, p = 0.049), although true significance is guarded due to a small number (Table 7).

Discussion

A push for increasing fully-trained general surgeons practicing in rural settings is essential for improving global access to surgical care [20]. Our study reports the 20-year

Table 7 Motivations predicting likelihood of practicing rurally

Response (N = 30)	Compassion for poor/underserved or religious/religious calling (N = 20)	Family/community or gain experience/training (N = 5)	Impact the surgical disparities (N = 5)	p value
Practicing rurally long-term				0.0499
No	1 (5%)	0 (0%)	3 (60%)	
Yes, in the next 2 years	3 (15%)	0 (0%)	1 (20%)	
Yes, in the next 5 years	4 (20%)	2 (40%)	0 (0%)	
Yes, in the next 10 years	9 (45%)	3 (60%)	0 (0%)	
Yes, indefinitely	3 (15%)	0 (0%)	1 (20%)	

success of a sustainable, rural-focused program in producing 67 trained general, pediatric and head and neck surgeons, all practicing in Africa, primarily in their home country, with successful short (<5 years) and long-term (>5 years) rural retention of graduates practicing in locations <50,000 population.

Brain drain historically has been a deeply rooted problem in sub-Saharan Africa with many physicians being lost externally to non-African countries or internally to urban centers [21, 22]. However, 100% of practicing PAACS surgeons stay in Africa and 79% stay in their home country. Two recent studies support our experience, showing approximately 84% of Ethiopian surgeons and 93% of COSECSA trained surgeons stay in Africa [12, 23]. Ongoing professional development has been reported to influence rural retention and be a significant motivating factor for emigration of health professionals [24–27]. These studies along with our experience suggest surgical training may be a *retention factor,* and our survey trends, predicting retention in current practice, further highlight the potential impact well-trained African surgeons have on thwarting brain drain.

Progress in training and retaining African surgeons is clear; however, the majority practice in urban centers, while approximately 30% of sub-Saharan Africans are geographically marginalized from emergency surgical care [28]. O'Flynn reports only 13% of surgeons in the COSECSA region work in areas with population less than 100,000 [2]. Our study shows PAACS' training programs have a high retention rate of African surgeons in rural settings (≤50,000) compared to many programs reported to date (which we have located) with 51% short-term and 35% long-term (beyond five-year agreement) retention rate [12, 23, 29]. Rural-focused GS programs from high-income countries (HIC) report 20–70% rural retention rate; however, rural classification varies (10,000–100,000 population) with intermittent long-term data [30–33].

PAACS' success is due in part to a multifaceted approach incorporating many factors shown to improve rural recruitment and retention, as seen from WHO's global policy recommendations and other successful American rural GS programs, focusing on rural background and rural education [34–36]. Although not statistically significant, in our study trainees spending time rurally during their pre-surgical education had a greater likelihood of anticipation to practice rurally in the short term. PAACS bases training mostly in underserved, rural areas, using curricula specifically matched to meet the diverse rural and underserved healthcare needs, which has also been emphasized by other training programs in LMIC [37]. Multiple studies from HIC validate our findings, citing a strong correlation between rural clerkships and rural-focused GS programs with future rural practice [30–32]. PAACS' diverse operative training is essential, as highlighted by a recent study showing significant discrepancies in the type of operations performed by primarily urban, American GS programs as compared to those performed in more austere, LMIC environments [38]. Surgical trainees worldwide lacking rural exposure risk being underprepared for practice in underserved areas with sparse resources and diverse disease burden [39].

For many students in LMIC and HIC, the cost of surgical training can be a limiting financial hurdle. The PAACS-trainee agreement for 5 years of post-training service provides a strong incentive for graduates who would otherwise be unable to participate in rural care. Although a systematic review did not show loan repayment programs to significantly affect rural retention rates, these studies focused on primary healthcare workers and included only one study from LMIC [40].

Various motivating factors have been cited for influencing the duration of physicians' practice in rural settings, such as sense of job and family satisfaction, and appreciation from community, while citing salary, work hours and poor working conditions as detrimental factors [7–10, 27, 41]. A majority of survey responders shared these positive influencing factors but without any significant predictive trends in the frequency of call, salary, or satisfaction with children's education, although the small number of responders may influence their predictability.

Studies note that successful rural retention incorporates a combination of these motivational factors [41, 42].

PAACS attrition rate (18%) was similar to American GS programs (9–18%) with the majority leaving within the first year [43, 44]. Our study identifies primary non-Anglophone speakers as a significant risk factor for remediation, however when remediation was provided the overall success rate was high (75%). Programs that remediate retain some residents who would otherwise be lost to attrition [44].

Despite having COSECSA qualifications, many PAACS graduates lack recognition as qualified surgeons within their own countries, which has also been a challenge for other LMIC surgery programs [45]. This is perhaps due to an unspoken belief that "rural-trained surgeons" are less qualified than urban, university-affiliated counterparts. However, our findings refute this idea and in fact may be quite the opposite, with PAACS rural-based training program producing surgeons with above average COSECSA passage rates, graduates feeling overall well trained, with diverse operative skills and many qualifying for surgical specialty training. The global challenge of standardizing surgical training is also contributory. Surgical education in Africa is varied, [46] with multiple regions using independent, minimally overlapping surgical certifications: WACS includes 22 countries; COSECSA including 12 countries; South Africa having its own college; and other African countries setting their own standards [47–50]. Ideally, a continent or Sub-Saharan standard could be established, as some regions around the world are already modeling [51, 52]. As standardization of African surgical training develops and COSECSA-qualified surgeons increase, we hope their recognition throughout Africa as qualified professionals would assist career development, prevent brain drain, and thus retain more rural surgeons.

Our study has significant limitations. Our survey captured only 45% of all graduates, likely due to communication/Internet challenges, professional obligations and privacy. PAACS maintains frequent contact with graduates, updating location and practice, thus survey fatigue may contribute. Selection bias may affect our reported retention rates because PAACS, a faith-based organization (FBO), recruits trainees with pre-existing religious, moral and ethical convictions that orient career goals toward service in underserved areas. However, much of the healthcare delivery in Africa is performed by FBOs and as successful collaborations with FBO and non-FBOs (COSECSA) continue, these underlying religious convictions may be a focus for future research [53, 54]. High PAACS' COSECSA passage rates may experience selection bias with only exceptional graduates sitting for examination. However, not all PAACS residents desire COSECSA recognition, as this qualification is not recognized in every country.

In conclusion, progress is being made in increasing and retaining African surgeons. PAACS has shown that a multifaceted approach, which recruits motivated trainees, uses a rural education model, incorporates financial incentives, and supports ongoing professional development can improve short- and long-term retention of surgeons working in rural African settings.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Appendix A: PAACS rural African surgeon study survey

Q1: What is your age?
Q2: What is your sex?
Q3: What country did you grow up in?
Q4: What size was the town you grew up in?

1. Less than 50,000
2. 50,000–100,000
3. 100,000–250,000
4. 250,000–500,000
5. Greater than 500,000

Q5: Was your medical school training outside country of your current surgical practice?

1. Yes, within an African country
2. Yes, Non-African country
3. No

Q6: During your year working as a medical officer, how many months did you spend at a rural hospital setting (less than 50,000 people).

1. 0 months
2. 1–2 months
3. 3–4 months
4. 4–6 months
5. More than 6 months

Q7: Did you have an occupation prior to attending medical school? If so, what field?

1. Medicine (nursing, OR technician, etc.)
2. Religious (pastor, clergy, etc.)
3. Governmental
4. Agriculture
5. Business
6. No previous occupation
7. Other: please list _____

Q8: What PAACS program did you graduate from?

_____

Q9: What month and year did you graduate? (example September 2007)

Q10: In what country and hospital are you currently practicing?

Q11: Did your spouse move with you to your current practice location?

1. Yes, living in same household
2. No, lives separate within 20 km of current location
3. No, lives separate within 50 km of current location
4. No, lives separate within 100 km of current location
5. No, lives separate more than 100 km of current location
6. Decline to answer

Q12: Does your spouse work outside the home?

1. Yes, full time (40 or more h/week)
2. Yes, part time (20–40 h/week)
3. Yes, part time (less than 20 h/week)
4. No
5. Not applicable, am not married
6. Decline to answer

Q13: How far away does your spouse's family (mother, father, siblings) live from current job site posting?

1. Less than 50 km
2. 50–100 km
3. 100–200 km
4. More than 200 km
5. Not applicable

Q14: How far away does your (surgeon's) family (mother, father, siblings) live from current job site posting?

1. Less than 50 km
2. 50–100 km
3. 100–200 km
4. More than 200 km
5. Not applicable

Q15: How many children do you currently have?

1. 1
2. 2
3. 3
4. 4
5. 5 or more
6. Decline to answer

Q16: How satisfied are you with the current educational opportunities for your children at current position?

1. Very satisfied
2. Somewhat satisfied
3. Neutral
4. Somewhat unsatisfied
5. Very unsatisfied

Q17: What is the size of the town/city of your current job posting?

1. Less than 50 thousand
2. 50–100 thousand
3. 100–250 thousand
4. 250–500 thousand
5. Greater than 500 thousand

Q18: How likely are you to continue practicing at your current location in 5 years?

1. Very likely
2. Somewhat likely
3. Neutral
4. Somewhat unlikely
5. Very unlikely

Q19: What is your surgical specialty?

Q20: How likely are you to pursue additional subspecialty surgical training?

1. Very likely—currently in subspecialty training or actively pursuing training
2. Somewhat likely
3. Neutral
4. Somewhat unlikely
5. Very unlikely—will continue to work as a General Surgeon

Q21: Are you a faculty member of PAACS?

1. Yes
2. No

Q22: How many years have you practiced as a surgeon since you graduated from PAACS?

1. 1
2. 2
3. 3

4. 4
5. 5 or more

Q23: How many job postings have you had since graduating PAACS?

1. 1
2. 2
3. 3
4. 4
5. 5 or more

Q24: What is the primary motivation for practicing surgery in your current environment?

1. _____(fill-in-the-blank)

Q25: Do you anticipate you will practice rurally (town population less than 50,000) long term?

1. Yes, including the next 2 years
2. Yes, including the next 5 years
3. Yes, including the next 10 years
4. Yes, indefinitely
5. No

Q26: How often are you on call?

1. Every day
2. Every other day
3. Every third day
4. Every fourth day
5. Every fifth day or more

Q27: On average how many patients do you see in clinic per week?

1. Less than 25
2. 26–50
3. 51–100
4. 101–150
5. More than 150

Q28: On average how many operations/procedures do you perform each week?

1. 0–5
2. 6–10
3. 11–15
4. 16–20
5. More than 20

Q29: For each surgical specialty, please tell us the percentage of cases you perform.

Your total should equal 100% (Example: General Surgery 50% + Gynecology 25% + Urology 15% + Head and Neck 10%.)
General Surgery _____%
Neurosurgery _____%
Pediatric Surgery _____%
Urology _____%
Gynecology _____%
Head and Neck_____%
Orthopedic Surgery _____%
Other _____%

Q30: Do you feel adequately trained for the healthcare delivery that is required of you?

1. Very adequately training
2. Somewhat adequately trained
3. Neutral
4. Somewhat inadequately trained
5. Very inadequately trained

Q31: How many times per week are you presented with a disease process/surgical procedure that you do not feel prepared to treat?

1. Never
2. 1–2
3. 3–4
4. 5–6
5. More than 6

Q32: Do you have reliable anesthesia services?

1. Yes, I am *never* limited in my surgical scope of practice due to anesthesia
2. Yes, but I am *occasionally* limited in my surgical scope of practice due to anesthesia
3. Yes, but *half the time* I am limited in my surgical scope of practice due to anesthesia
4. No, but I often will administer my own anesthesia for operations
5. No, unreliable anesthesia services, limits my ability to operate on patients

Q33: Do you have Internet services?

1. Yes, works properly every time I need it (100%)
2. Yes, works properly most of the time that I need it (75%)
3. Yes, works properly half of the time that I need it
4. Yes, works properly infrequently (25%)
5. No, I do not have reliable internet services

Q34: How often are you involved in intentionally training residents, medical students or other healthcare personnel?

1. Daily
2. Weekly
3. Every other week
4. Monthly
5. Rarely involved in training residents, medical students or other healthcare personnel

Q35: Do you have a senior surgical mentor? If so, how frequently do you communicate?

1. Yes, weekly
2. Yes, monthly
3. Yes, quarterly
4. Yes, Biannually
5. Yes, Annually
6. No, I do not have a senior surgical mentor

Q36: How valued/appreciated do you feel by your current hospital staff and community?

1. Very valued and/or appreciated
2. Somewhat valued or appreciated
3. Neutral
4. Somewhat devalued or appreciated
5. Not valued or appreciated, in fact antagonistic

Q37: How satisfied are you with the opportunities you have for ongoing medical training?

1. Very satisfied
2. Somewhat satisfied
3. Neutral
4. Somewhat unsatisfied
5. Very unsatisfied

Q38: Besides your work as a surgeon, how many other leadership positions do you hold in your community? (Examples include leadership in church, local schools, rotary club, Non-governmental organizations, etc.)

1. 0 roles/positions
2. 1 role/position
3. 2 roles/positions
4. 3 roles/positions
5. 4 or more roles/positions

Q39: Which of the following most closely describes your surgical practice?

1. Only work at *rural* hospital
2. Only work at *urban* Hospital
3. Work at both *rural* and *urban* hospitals

Q40: Which of the following most closely describes your surgical practice compensation?

1. Government Hospital Stipend
2. Mission hospital stipend
3. Private Practice
4. Other: (if combination please include) _____

Q41: What is your monthly salary?

1. Less than $ US 500 per month
2. $ US 500–$1000 per month
3. $ US 1000–$2500 per month
4. $ US 2500–$5000 per month
5. Greater than $ US 5000 per month
6. Decline to answer

Q42: Do you regularly attend a local church?

1. Yes, on average weekly
2. Yes, on average twice a month
3. Yes, on average monthly
4. Yes on average every other month
5. No

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