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Task Shifting and Sustainability: Nonphysician anesthetist satisfaction and role in the field - a mixed method cross sectional analysis in primary and secondary hospitals of Nepal

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Abstract

Background

The lack of skilled healthcare workers and poor retention in rural areas limits access to surgical care globally, with the greatest disparities in low- and middle-income countries. In Nepal, the one-year Anesthesia Assistant (AA) program trains non-physician cadres to provide anesthesia to address this gap.

Methods

A cross-sectional satisfaction survey using Spector's Job Satisfaction Survey (JSS) was distributed to all AAs working in Primary and Secondary government hospitals, yielding 91 responses from 88 hospitals. Bivariate analyses using chi-squared and t-tests examined associations between job satisfaction and respondent or facility characteristics. Additionally, qualitative data were collected through 7 focus group discussions, 8 key informant interviews, and 14 in-depth interviews with AAs, hospital staff, and policymakers at seven purposively sampled government hospitals.

Results

AAs were nearly evenly split in overall job satisfaction (47% satisfied, 53% dissatisfied). Highest satisfaction was reported in domains related to the nature of work and coworker relationships, while the lowest satisfaction scores were related to pay, fringe benefits, and operating conditions. Significant associations were found between satisfaction and contract status, NSI support, and the availability of surgical services. Qualitative findings reinforced the importance of supportive teams and meaningful work, while highlighting structural barriers such as limited career progression, poor working conditions, and inadequate institutional support.

Conclusions

AAs play a critical role in expanding access to surgical care in rural Nepal yet face persistent structural challenges that threaten retention. Strategies to improve satisfaction must address both intrinsic motivators and systemic barriers, including formal career pathways and improved working environments, to sustain this essential workforce.

Introduction

A healthcare system is completely dependent on its workforce; having the right number of people with the right skills in the right place at the right time (1). Yet, there continues to be a growing global shortage of healthcare professionals (2). The WHO estimates that for every 1,000 people there are 2.9 physicians in high income countries (HICs), compared to only 0.9 in LMICs (3, 4). On top of global pressures, low- and middle- income countries (LMICs) face even greater shortages due to discrepancies of pay and quality of life between their own country and host countries, accelerated by active recruitment by HICs to

supplement their own shortages and various personal and systemic push and pull factors (5, 6). If these trends continue, the progress towards equitable primary health care systems will remain out of reach as LMICs fall farther behind (7, 8).

Nepal has long struggled with healthcare worker retention, especially in rural and remote areas due to its mountainous terrain, where it is estimated that 2.4 million people will not have access to necessary surgical care during their lives (9). Despite challenges, efforts to improve healthcare access have shown substantial progress, reducing the maternal mortality rate from 379 per 100,000 in 2000 to 151 per 100,000 in 2021 (10). However, challenges remain. A survey conducted by the International Labour Organization found that 50% of responding medical and nursing students planned to migrate abroad, motivated mostly by better salaries, better living conditions, and better working environments (5).

In an attempt to address the healthcare worker shortage, Nepal has employed task-shifting of lower level health cadres to provide specialized services, typically reserved for specialists (11). The Nick Simons Institute (NSI) has partnered closely with the Ministry of Health and Population (MoHP) to develop a myriad of healthcare cadres including the Advanced Skilled Birth Attendant (ASBA) to train medical officers to provide Cesarean sections (CSs), or the Anesthesia Assistants (AA) to train lower level health cadres to provide anesthesia under the supervision of an anesthesiologist or, more often, a family physician or MDGP (12).

One study found that six AAs were conducting 8,000 operations annually at a rural 160-bed mission hospital annually in 2008 (13). In 2014, 14 AAs reported an annual caseload of 50–788 per each (14). And while Nepal's specialist Surgeon-Anesthesiologist-Obstetrician (SAO) density was only 0.4 per 100,000 population, the density of non-specialist SAOs led by MDGPs and supported by AAs was found to be eight times higher, with a density of 3.1 per 100,000. However, this is still significantly below the Lancet Commission on Global Surgery's 2030 target of 20 per 100,000 (12). This suggests that AAs play key roles in Nepal's surgical workforce. However, they remain poorly studied with little known about their job satisfaction or retention in rural areas.

This paper aims to fill this gap by exploring the roles of AAs in the field and better understanding the factors associated with job satisfaction. This research can inform the MoHP's development of the National Surgical, Obstetric, and Anesthesia Plan and provide insights into task shifting and staff retention strategies in other low-resource settings.

Methods

Quantitative Methods

Data Collection and Preparation

AAs working in governmental hospitals were assessed using Spector's Job Satisfaction Scale (JSS) (15). The JSS survey was formatted to a Google Forms survey that was emailed to all AAs working at

Primary and Secondary A government hospitals during November 2024 to December 2024 (n = 95). This included AAs working at health facilities that may not have had a functional operating theater and were not utilizing their skills to best represent actual satisfaction of the workforce. Ninety-six percent of AAs responded to the survey (n = 91). Retrospective surgical data for the 2022/23 fiscal year was retrieved from the Health Management Information System (HMIS) database. Population data by year was retrieved from the national census and province-wise HDI was obtained from the Nepal Human Development Reports.

Data Analysis

The survey data was downloaded as a CSV file, which was imported and analyzed in R. Job satisfaction obtained via a 6-point Likert scale was categorized using Spector's JSS guidelines into dissatisfied, ambivalent, and satisfied (15). The data was dichotomized based on the median satisfaction score for further analysis. The primary outcome was overall satisfaction, which was assessed against relevant hospital-level variables (hospital level, hospital governance, geography, Minimum Service Standards (MSS) score similar to a hospital quality or accreditation score, and provision of surgery) and individual characteristics (education, work experience, course, and employment contract) collected through the survey. Age and sex were not available for analysis.

Bivariate analysis through crosstab using chi-square test was used to identify the association between Job Satisfaction and demographic and environmental factors. Significant independent variables where $p < 0.05$ considered significant were then further analyzed by job satisfaction domain.

Qualitative Method

Data Collection and Preparation

Qualitative data was purposely sampled from seven government hospitals representing each province, hospital level, and governance. Three hospitals had Anesthesiologists, three hospitals had other consultants, and one hospital had an ASBA in the OT team during the survey. Topic guides were developed iteratively throughout data collection to guide the Focus Group Discussion (FGD), Key Informants interviews (KII) and In-depth Interviews (IDI). IDI with Medical Superintendents, Anesthesiologist and directors, KII with AAs and FGD with OT team and department heads of the hospitals were conducted. Further, KIIs were completed with four directors of the Provincial Health Directorate and MoHP, Kathmandu (See Table 3).

Interviews were transcribed and translated into English. A thematic content analysis method was applied to analyze the data, whereby the research team read a sample of the transcripts. A descriptive report of the preliminary analysis was written by one research team member, after which the research team independently generated themes from the data and came to a consensus through discussion. The data were coded according to themes and Atlas-ti was used for theme generation.

Results

Descriptive Analysis

The JSS Google Forms survey received 91 responses from 88 different government hospitals. Basic demographics of respondents were assessed and are reported in Table 1.

Table 1
Demographics of AA Survey Respondents (n = 91).

Category		n	(%)
Work Experience	< 3 years	38	(41.8%)
	≥ 3 years	53	(58.2%)
Contract	Contract	46	(50.5%)
	Permanent (Loksewa)	45	(49.5%)
Current Health Facility	Primary Hospital	46	(52.3%)
	Secondary A Hospital	38	(43.2%)
	Secondary B Hospital	2	(2.3%)
	Tertiary Hospital	2	(2.3%)
Hospital Governance	Local	21	(23.9%)
	Provincial	67	(76.1%)
CSSP Supported hospitals	Yes	41	(46.6%)
	Phased Out	20	(22.7%)
	No	27	(30.7%)
NSI-supported AA Staff	Yes	29	(33.0%)
	No	59	(67.0%)
Hospital MSS Scores	Mean (± s.d.)	74.3%	± 14.0%
Hospitals providing any major surgery	Yes	83	(94.3%)
	No	5	(5.6%)
Number of Major Surgeries	Mean (± s.d.)	180	± 203
Availability of Anesthesiologists or consultants	Anesthesiologist	7	(7.7%)
	Consultant*	76	(83.5%)
	ASBA	3	(3.3%)
	No Surgeon	5	(5.5%)
Anesthesia	Spinal	82	(98.80%)
	Intravenous Anesthesia	80	(96.40%)
	Local	53	(63.90%)

Category		n	(%)
	Regional Block	52	(62.70%)
	General	20	(24.10%)
Job Satisfaction	Dissatisfied	48	(52.7%)
	Satisfied	43	(47.3%)

*Consultant: Hospitals with Consultants (MDGP, Orthopaedic, Surgeon etc) during the study period.

Work experience was well distributed, suggesting long term impact on the healthcare workforce. AAs were also more likely to be working at lower-level hospitals, with a majority serving at either Primary hospitals (52.3%) or Secondary A hospitals (43.2%). Further, only 7.7% of AAs were working with an anesthesiologist, suggesting that MDGPs are providing the majority of the supervision, making AAs the primary provider of anesthesia in rural settings.

Of the 91 respondents, 98.8% of AAs provided spinal anesthesia and 96.4% intravenous anesthesia, while general anesthesia was less frequently provided (24.1%). Additionally, 68.3% AAs worked alongside an MDGP, while 50.0% collaborated with gynecologists, 43.9% with orthopedic surgeons, and 40.2% with general surgeons. Besides OT departments, the majority of AA's work took place in emergency rooms (ER) (79.6%), with occasional cases handled in the outpatient department (OPD) (35.2%), and other wards (18.5%). This suggests that AAs are utilizing their training and contributing to wider hospital functioning beyond anesthesia alone.

Ten AAs (10.9%) did not have a functional operating theater (OT) at their current placement, limiting the use of their skills. The greatest hindering factor was the lack of a surgeon (n = 9), followed by shortages in medicine, equipment (6), OT facilities (4), and insufficient community support (2).

Job Satisfaction

The job satisfaction levels among the participants showed a slight inclination towards dissatisfaction with 53% of the respondents reported being dissatisfied with their jobs, while 47% expressed satisfaction suggesting a pretty even split in satisfaction from respondents, with average satisfaction of 60% (Fig. 1).

Job Satisfaction by domain (n = 91)

AAs reported mixed feelings across nine job satisfaction dimensions assessed in the JSS. Lowest satisfaction was with fringe benefits (46%), followed by Operating Conditions (51%), and Pay (52%). Supervision received relatively positive feedback, with more than two thirds of respondents (70%) having a positive view of their supervisor. The highest satisfaction was with Nature of Work (83%), followed by Coworkers (74%), and Supervision (70%), although these had several outliers.

The bivariate analysis of job satisfaction among AAs reveals a significant association between the type of service and job satisfaction (Supplemental Table S2), with AAs hired on a contract basis being significantly more likely to be satisfied compared to their permanent counterparts ($p < 0.001$). NSI-supported AAs ($p = 0.004$) were also more likely to be satisfied while CSSP supported hospitals were borderline significant ($p = 0.056$). However, there is significant overlap between AAs supported by NSI and contract employees as 100% NSI-supported employees are hired on a contract basis, making up 63% of all contract employees of respondents. Finally, AAs at hospitals that performed more than 10 major surgeries per year were more likely to be satisfied with their position ($p = 0.029$). Significant results are disaggregated by domain in Fig. 1, with contract type being selected in lieu of NSI contract.

No other significant associations were found between job satisfaction and other variables such as years of experience, availability of higher supervisors, type of hospital, or hospital governance. Overall, the contract type and utilization of skills stand out as the most influential factor in determining job satisfaction among the variables studied.

In summary, while some AAs are satisfied with their roles, particularly those that are supported by NSI and/or on contract, significant dissatisfaction persists concerning pay, promotion, and operating conditions. This suggests a need for targeted interventions to improve job satisfaction across the board.

Job Satisfaction by Hospital Context

Job satisfaction varied significantly across contract types in multiple domains, as illustrated in Fig. 1 and Table 2. Loksewa (permanent) staff reported significantly lower mean satisfaction scores in domains regarding motivation, including Contingent Rewards ($p = 0.013$), Fringe Benefits ($p < 0.001$), and Pay ($p < 0.001$). Pay and Fringe benefits showed the greatest magnitude of difference between contract types, with contract employees being 19% and 16% more satisfied, on average. This suggests that systems for motivating the permanent staff are insufficient and lead to higher dissatisfaction compared to non-permanent contract staff. Inversely, it may suggest that NSI's support via a contract employment is successful at improving satisfaction in these domains. Notable disparities were also observed in Nature of Work ($p = 0.017$), Communication ($p = 0.005$), Supervision ($p = 0.016$).

AAs at hospitals with more than 10 major surgeries a year reported significantly greater satisfaction (61%) compared to AAs at hospitals with less than 10 major surgeries annually (55%) ($p = 0.029$). However, when broken up by domain, only pay ($p = 0.020$) and supervision ($p = 0.006$) were significant as shown in Fig. 1.

No significant differences were found in Operating Conditions, Coworkers, or Opportunities for Promotion ($p > 0.05$), suggesting similar experiences in these domains regardless of contract type.

Table 2
Domains of Job Satisfaction by Contract Type (n = 91) and Surgical Volume at Hospitals (n = 88). Welch Two Sample t-test used for analysis.

Job Satisfaction Domains.	**Mean JSS Score by Domain (%)**		**Absolute Difference**	**df**	***p-value***
Contract Type	**Contract**	**Loksewa (Permanent)**			
Communication	64.49	53.57	10.92	84.67	0.005 **
Operating Conditions	52.36	49.60	2.76	82.89	0.362
Coworkers	76.54	70.83	5.71	78.85	0.138
Fringe benefits	53.98	38.00	15.98	84.48	< 0.001 ***
Nature of Work	87.23	78.27	8.96	75.17	0.017 *
Pay	60.69	41.96	18.73	85.52	< 0.001 ***
Opportunities for Promotion	55.16	52.88	2.28	84.54	0.462
Contingent Rewards	58.24	48.71	9.53	85.90	0.013 *
Supervision	74.73	64.48	10.25	85.97	0.016 *
Surgical Volume	**< 10 Surgeries per year**	**≥ 10 Surgeries per year**			
Communication	52.08	60.24	8.16	21.39	0.071
Operating Conditions	57.64	50.28	7.36	17.17	0.059
Coworkers	66.67	74.02	7.35	15.06	0.19
Fringe benefits	37.15	47.97	10.82	16.07	0.074
Nature of Work	76.74	84.55	7.81	14.00	0.211
Pay	42.36	53.70	11.34	23.12	0.020 *
Opportunities for Promotion	52.78	54.46	1.68	13.56	0.754
Contingent Rewards	50.35	54.51	4.16	14.42	0.499
Supervision	56.60	71.88	15.28	19.07	0.006 **

Qualitative Analysis

Qualitative results explore key themes related to AA's satisfaction, including their role in peripheral and larger hospitals, perception towards AA, surgical care before and after their deployment, continuity of emergency surgical care, working environment and challenges. Table 3 summarises the characteristics of hospitals and interview types included in qualitative analysis.

Table 3
Characteristics of Respondent Hospitals and Directors (n = 29). Focus Group Discussion (FGD), Key Informant Interview (KII), In Depth Interview (IDI).

Category	Item	FGD (n = 7)	KII (n = 8)	IDI (n = 14)
Province	Koshi	1	1	2
	Gandaki	1	1	2
	Bagmati	1	1	2
	Madhesh	1	2	1
	Lumbini	1	1	1
	Karnali	1	1	1
	Sudurpashchim	1	1	1
Hospital Level	Primary	3	4	3
	Secondary A	4	4	7
Hospital Governance	Province	5	5	8
	Local	2	3	2
Geographical Region	Hills	4	4	7
	Himal	1	1	1
	Terai	2	3	2
Directors	Province	0	0	3
	Federal	0	0	1

Perceived Role and Value of AAs

Across both rural and urban hospitals, AAs are widely recognized as essential members of the surgical team. Their contributions vary by context, but their value is consistently emphasized by clinicians, hospital leaders, and the AAs themselves who find satisfaction in their work.

Rural and Peripheral Hospitals

In rural and peripheral hospitals, AAs are often the enablers of any surgical services at all, making cesarean sections and emergency surgeries possible. As one health worker at a remote primary hospital

described, *“Last week AA went for the exposure visit, in his absence we had to refer surgical cases to another hospital. So, there is no possibility of surgeries without AA even if we hire multiple surgeons.”*

Larger Hospitals

In larger or Secondary A hospitals, AAs enhance capacity by providing around-the-clock coverage and enabling multiple surgeries to take place concurrently. An anesthesiologist working alongside an AA shared, *“Based on the situation in Nepal, I have found that the role of an anesthesia assistant is crucial. I previously worked at a provincial hospital, one of the largest in western Nepal, where there was a significant need for anesthesia assistants to run multiple OT simultaneously. Emergency care services were being provided even in my absence.” However, one AA is not enough. At least four should be available with four shifts.”* Similarly, a Me.Su. noted a shift in recognition, *“A surgeon is mandatory to perform surgery, and the presence of AA is necessary… After stopping surgery due to the lack of AA, the importance of AA is now understood by all.”*

Perception of AAs

AAs are also praised for their dedication, professionalism, and teamwork. A surgeon at a primary hospital noted, *“They are very dedicated to their work with no compromise. They are working 24 hours, seven days, and are always available whenever we need.*” Their clinical competencies are well-regarded, as an Anesthesiologist at a Secondary A hospital said, *“The AA working in our hospital is really good at her job. She gives general anesthesia in my presence… There have been no errors from her side ever since I worked here.*”

Satisfaction

While some AAs express concern about long working hours and limited support, most describe their work as meaningful, with high levels of intrinsic motivation tied to service delivery, particularly for underserved populations. This highlights the component of equity that AAs provide, ensuring affordable and accessible life-saving services in rural Nepal. An AA at a Primary hospital said, *“Talking about job satisfaction, I am happy. We perform 55–60 CS per month. Many cases come with uterine rupture and with our effort their life is saved. The patients visiting this hospital are mainly poor. The rich patients go to private hospitals or urban areas. The patients visiting these 15 bedded hospitals are from surrounding municipalities and referred cases from neighboring districts. These cases bring me satisfaction.”*

Surgical Services Before and After AA Deployment

Before AA Deployment

Before the deployment of AAs, many district hospitals, especially primary-level facilities, were unable to provide even basic surgical services. Operations were limited by poor infrastructure, lack of equipment, and a shortage of trained personnel.

“I joined this hospital seven years ago; I heard that before that some surgeons have worked here and performed some surgeries, but service was not regular, when I joined the condition of the OT set up was

very poor, there was limited surgical equipment and sets." AA, Secondary A Hospital

After AA Deployment

The introduction of AAs marked a turning point. In many hospitals, they were instrumental in initiating and expanding cesarean sections, general surgeries, and even laparoscopic procedures. As one clinician reported, *"We have been performing all the surgeries: General, Orthopedics, and Gynecology. Today we are starting laparoscopy."*

While the scope of services continues to vary based on available human and material resources, AAs have enabled a clear expansion in surgical capacity. A director from the Ministry of Health and Population reflected, *"We do not have exact data… but with an overview from MoHP, the rate of surgery is higher in higher-level hospitals and less in peripheral hospitals. Nevertheless, some peripheral hospitals are performing well despite limited infrastructure and HR."*

Barriers

Provincial health leaders emphasized the lingering barriers, particularly infrastructure, equipment, and trained staff, and the need for systemic investments to sustain and scale up surgical services. A provincial Director said, *"We have many barriers to start surgical services—like infrastructure, equipment, skilled HR like MDGP, AA etc. We cannot imagine hospitals without surgery.*"

"Currently some of the surgeons like MDGP, Surgeon, Gynecologist started to work in some of the hospitals however we are not in the condition to deploy Anesthesiologists to all the district level hospitals to support surgeons and surgeons cannot perform alone. So AA is the only option that we have for now, we have deployed one anesthesia assistant to each hospital via various resources, however the number is not sufficient, if he/she must leave the hospital the service is interrupted, so there should be at least two AA in the hospital to fill the gap." - Provincial Director

The federal government has begun to respond, with planning underway to address gaps more strategically. The *"MoHP is developing a National Anesthesia and Surgical Obstetric Plan… a 5-year plan in which we will design necessary HR and other necessities for emergency surgeries."*, stated an MoHP Director

Overall, the deployment of AAs is widely seen as a foundational step in improving surgical access in Nepal's peripheral hospitals. However, continued support across all levels of government is needed to translate this early success into a fully functional and equitable surgical system.

AAs Role in Emergency and Surgical Continuity

Referrals

Building on their critical role in expanding surgical capacity, AAs are also central to maintaining emergency services and reducing patient referrals, especially in remote and resource-constrained settings. Their presence has not only enabled surgeries to occur, but has also ensured continuity of care

during emergencies, where delays can be fatal. In many hospitals, AAs have become the de facto frontline providers for stabilizing patients and managing critical cases that would otherwise be referred to distant tertiary centers. As an AA at one of the most remote districts shared, *“Referrals have decreased significantly as we provide emergency surgical and medical services from here. only case that need specialist services are refereed from here”*

When AAs are unavailable, hospitals are forced to refer even routine emergencies. A Me.Su. shared a stark example, *“AAs are the backbone of peripheral hospitals. Last week, when our AA was unavailable, we had to call a helicopter to refer a pregnant woman. This shows their importance in reducing referrals and saving lives.”*

Even in better-equipped hospitals, the absence of general anesthesia machines, CT scanners, or ICUs limits service delivery. In such cases, AAs do their best to triage and manage patients before referral.

“Cases that need ICU set up, complicated cases that need multispeciality services are referred”- AA at a Primary hospital.

“Nowadays most of the cases are managed here, complex cardiac cases that need specialized set up are referred from here.” Anesthesiologist, Secondary A

Despite system constraints, AAs serve as a stabilizing force in Nepal’s district hospitals. Their presence ensures continuity of care, timely emergency response, and reduced financial and physical burden on patients who would otherwise need to travel long distances, preventing catastrophic health expenditures.

Work Environment and Challenges

While AAs are highly valued for their contributions, their ability to function effectively is often limited by structural and systemic challenges. These include inadequate equipment, resource delays, overwork, and bureaucratic barriers. These issues compromise both the quality of care and the wellbeing of the providers themselves.

Supportive but Constrained Settings

In some facilities, AAs report positive relationships with colleagues and opportunities to apply their skills. However, these are often tempered by practical limitations. One AA shared, *“I am inspired and motivated through this hospital to implement the skills I learned. But due to the lack of anesthesia machines and anesthesiologists, we are not able to implement our skills in general anesthesia.”*

Hospital leaders, too, expressed frustration about the disconnect between motivation and means. A Superintendent said, *“The provincial government sends medicine and HR to provincial hospitals. But in local-level hospitals, we must get permission for everything—HR, supplies. There is no autonomy. We are stuck.”*

Supply Chain and Infrastructure Gaps

A common thread across interviews was the persistent delay or absence of essential supplies. These disruptions significantly affect surgical and emergency services. An AA at a Secondary A hospital said,*"Medicines are delayed for almost a month. Our suggestions to purchase from other sources are seen as corruption, which is wrong. Medicines should always be available."* These logistical delays are not just operational, but they undermine morale and disrupt continuity of care.

Excessive Workload and Role Creep

AAs are frequently responsible for multiple clinical areas, often beyond their formal training. AAs were found to be handling multiple roles beyond anesthesia, such as emergency resuscitation and patient care. Further, the growing number of surgical cases, particularly in orthopedic and caesarean surgeries, without a corresponding increase in AAs is contributing to increased workload.

"Besides AA, I work as OT in-charge, I'm on call for emergencies, I do resuscitation, intubation, IV access for difficult cases." - AA, Primary Hospital

Workload pressures are particularly intense in busier, high-level hospitals and both anesthesiologists and hospital leadership echoed the need for increased staffing.

"Usually we have 120–130 orthopedic cases, 80–90 surgery cases, and 25–30 CS cases per month. It's too much." - AA, Secondary A Hospital

"The workload is so much that two people cannot handle it. We're on call 24 hours and doing major cases frequently—it's hectic." (Anesthesiologist, Secondary A, Gandaki)

"Due to 8–10 surgeries per day, both the AA and anesthesiologist are overloaded. One more AA is definitely needed." - Me.Su., Secondary A

Retention and Career Progression

The demanding working environment, combined with limited recognition and unclear career pathways, presents significant challenges to the long-term retention of AAs in Nepal's public hospitals. While many AAs are committed to serving rural communities, the absence of financial incentives, opportunities for growth, and professional legitimacy undermines motivation over time.

Financial Incentives and Motivation

AAs frequently work long hours with minimal compensation. While many express satisfactions in saving lives, this is not always enough to sustain retention. This is known by leadership, as Me.Su. at a Primary Hospital shared, *"If they are working for many hours, then they need to be motivated with some extra benefits. If their expectations cannot be met, it is very difficult to retain anyone.*" A Provincial director

shared, *“Currently, health workers are overburdened with minimal pay. With this condition, they cannot work for a long time.”.*

Career Stagnation and Policy Frustration

Despite undergoing specialized training, many AAs remain at the same civil service level as before. This is a recurring source of frustration, especially for those with advanced qualifications, Even AAs with bachelor’s and master’s degrees face limitations.

“We study three years PCL, gain two years’ experience, train for one more year, and still must work in a fifth-level position. Policymakers did not think about our careers.” - AA, Primary Hospital

“I was fifth level as a nurse, and after doing the AA course, I’m still fifth level. There is no growth. Sometimes I think of changing my profession.”- AA, Secondary A,

“There is huge discrimination. We [anesthesia graduates] *can only reach the seventh level. Entry for all the graduates is limited to the fifth level. This must be addressed.”* - AA

Further, the lack of a professional post for AAs despite their training exacerbates the issue:

“AA is seen as a training, not an academic course. But there is no designated post for it. Unless we make this an academic program, it’s hard to create appropriate posts. ” - Director, Federal MoHP

Limited Incentives to Enter the Field

Health Assistants and nurses often see little value in pursuing the one-year AA course because it does not offer promotion or improved status as one Me.Su. shared, *“HA or Staff Nurses already at fifth level see no benefit in taking the AA course. After completing it, they stay at the same level. There should be a provision for sixth-level posting.*”

This disconnect between training, recognition, and advancement discourages future enrolment and weakens retention in the long term.

Triangulation of Results

Results from the quantitative and qualitative portions were then triangulated using JSS domains to identify areas of convergence and divergence. Almost all areas had strong convergence, with qualitative data providing insight into why domains were seen negatively or positively. Communication, operating conditions, coworkers, nature of work, opportunities for promotion, and contingent rewards had strong convergence. In contrast, fringe benefits, pay, and supervision at least partially diverged, shown in Table 4.

Table 4
Triangulation Matrix of Quantitative and Qualitative Findings by Job Satisfaction Domain.

Domain	Quantitative Findings	Qualitative Findings	Convergence/ Divergence
Communication	Moderate satisfaction overall (Contract: 64.5%; Permanent: 53.6%, p = 0.005).	AAs report unclear expectations from leadership; poor vertical communication, especially under local governance.	**Convergence**: Both sources identify communication challenges, especially under bureaucratic hospital systems.
Operating Conditions	Lowest rated domain overall; not significantly different by contract type or volume of surgery.	AAs cite lack of equipment, delayed supplies, and poor infrastructure, especially in local-level hospitals.	**Convergence**: Strong alignment on the impact of poor working conditions.
Coworkers	High satisfaction across all groups (Contract: 76.5%, Loksewa: 70.8%).	AAs described strong team cohesion and mutual respect with OT staff and surgeons. This was reflected by team and supervisor attitudes towards AAs.	**Convergence**: Consistent reports of collegial relationships and supportive team dynamics.
Fringe Benefits	Lowest satisfaction, especially among Loksewa staff (38.0% vs. Contract: 54.0%, p < 0.001).	Not a major theme in interviews, though some mentioned lack of housing or living support indirectly.	**Partial Divergence**: Quantitative data showed very low satisfaction, especially among permanent staff, but qualitative data did not highlight this as a major concern.
Nature of Work	Very high satisfaction (Contract: 87.2%, Loksewa: 78.3%, p = 0.017).	AAs find meaning in emergency care, maternal health, and surgical work, especially in underserved areas and serving the poor.	**Convergence**: Both methods show intrinsic motivation and pride in clinical service.
Pay	Among the lowest-rated domains. Significantly lower satisfaction for Loksewa (42.0%; p < 0.001) and low surgical volume (42.4%; p = 0.020)	Strong qualitative dissatisfaction: "*We are working so much but paid so little*"; linked to burnout.	**Convergence**: Reinforced concern about pays across both data types. **Partial Divergence**: AAs with higher surgical volume are less dissatisfied with pay, suggesting skills utilisation may eliminate some pay dissatisfaction.

Domain	Quantitative Findings	Qualitative Findings	Convergence/ Divergence
Opportunities for Promotion	Low ratings overall but no significant difference by group.	Strong qualitative theme: AAs report stagnant roles, lack of recognition, and no incentive to enroll in AA courses.	**Convergence**: Clear and aligned across sources. AAs do not see a way forward in their careers.
Contingent Rewards	Low satisfaction (Contract: 58.2%, Loksewa: 48.7%, p = 0.013).	AAs feel overlooked; effort not rewarded unless tied to external support such as NSI incentives.	**Convergence**: Strong alignment in perceived lack of reward structure and aligned with poor pay.
Supervision	Higher satisfaction among contract staff (74.7%, p = 0.016) and higher surgical volume hospitals (71.9%; p = 0.006)	Mixed views: AAs trust immediate supervisors (MDGPs) but feel unsupported and frustrated institutionally.	**Partial Divergence**: Quantitatively, supervision scored relatively high, especially for contract staff and hospitals with higher volumes of surgeries. However, some AAs expressed frustration at lack of institutional support, unclear hierarchies, or autonomy under local governments. This suggests a differentiation between direct clinical supervision and system-level management.

Fringe benefits were rated the lowest for any domain. However, this theme did not emerge in the interviews suggesting that although AAs may be very dissatisfied by fringe benefits, or lack-there-of, they are not top-of-mind to AAs and thus may not have a large influence on overall satisfaction. Further, although Pay showed strong convergence, strongly reinforcing concerns about low pay, there was partial divergence. AAs with higher surgical volume were less dissatisfied with pay, suggesting skills utilisation may eliminate some pay dissatisfaction and make AAs more satisfied overall. Finally, supervision saw the greatest divergence with themes emerging differentiating between local, direct, medical supervision, and system-level and institutional supervision. Overall, AAs were highly satisfied with supervision but themes in the qualitative interviews highlighted strong dissatisfaction with a lack of institutional support, unclear hierarchies or autonomy under local governments in interviews. This suggests a differentiation between direct clinical supervision, which was more positive, and system-level management. Further, AAs at hospitals with a lower surgery volume were significantly less satisfied with supervision (p = 0.006), suggesting they may be unhappy with the lack of skill utilisation.

Discussion

Five billion people lack access to safe and affordable surgical care, with the majority residing in low- and middle-income countries (LMICs), where 9 out of 10 individuals are without basic surgical services (16). Further, only 6% of surgical procedures are performed in these countries despite comprising 48% of the

global population (17). Of the nearly half a million specialists/physician anesthesiologists globally, only 12% reside in LMICs (17). Expectedly, this has been associated with a high perioperative morbidity and mortality rate and it is estimated that one quarter of maternal deaths could be prevented with access to surgical and anesthesia care in LMICs (18, 19). The Anesthesia Assistant (AA) is a task-shifting program to train health assistants and nursing staff to perform anesthesia under supervision by the Nick Simons Institute and the Government of Nepal's MoHP. This paper's mixed-methods approach clarifies the important role that AAs play in surgical access across Nepal, highlighting challenges and opportunities to improve retention of healthcare workers and surgical access.

AAs were repeatedly described as the "*backbone*" of the healthcare system and playing a "*vital role in the team*" across hospitals. They frequently enabled major surgery at lower-level hospitals, serving poor and remote populations, such as CSs or orthopedics, where surgeries would otherwise have been impossible. As one respondent noted, "*If an AA was available, the poor people would not have to spend a lot of money."* Another AA shared, "*The patients visiting this hospital are mainly poor. The rich patients go to private hospitals or urban areas… These cases bring me satisfaction.*" These narratives highlight how AAs help mitigate both geographic and financial barriers to care, two core dimensions of inequity in LMIC health systems (13, 20). Their presence reduces the risk of catastrophic health expenditures and promotes timely access to essential services. In this way, AAs contribute not only to surgical scale-up, but to the broader goals of universal health coverage and social protection in rural Nepal. At higher level hospitals, AA played a supportive role, enabling concurrent surgeries and 24 hour coverage of the emergency room, allowing for shared shifts and reduced load on a single staff member. This reflects findings from other task-shifting initiatives in Nepal, such as ASBAs, who were associated with reduced burnout and improved morale through shared shifts and distributed workload (14).

Overall, AAs were nearly evenly split, with 47% reporting satisfaction and 53% dissatisfaction. The domains with the greatest satisfaction were nature of work (83%), coworkers (74%), and supervision (70%). Other research found that interpersonal relationships, work climate, and supportive supervision were the most important influences on satisfaction of rural healthcare workers in LMICs (21). The poorest satisfaction domains were fringe benefits - or the lack thereof (46%), operating conditions (51%), and pay (52%). These results echo existing research, which found main motivating factors to be interpersonal, while discouraging factors included low salaries and poor working conditions in Viet Nam (22). Another study of surgeons in east, central, and southern Africa found that addressing working conditions and equality of promotion opportunities was necessary to reduce burnout and improve retention (23). These findings suggest that job satisfaction among AAs in Nepal is not driven by a single continuum from dissatisfaction to satisfaction, but by two distinct sets of influences. This aligns with Herzberg's Two-Factor Theory, which distinguishes between motivators, such as the nature of the work and coworker relationships, which actively promote satisfaction. This is in contrast to hygiene factors, such as poor working conditions, low pay, and weak promotion pathways, which primarily *prevents* dissatisfaction (22, 24, 25).

This pattern is reflected in our findings: while a functional operating theater is necessary to avoid frustration, it does not appear to enhance satisfaction. In contrast, saving maternal lives and working within cohesive operating theater teams clearly fueled intrinsic motivation. AAs working in hospitals performing ≥ 10 major surgeries annually were significantly more satisfied ($p = 0.006$), suggesting that opportunities for skills utilization reduce dissatisfaction while also enhancing motivation. As one AA shared: "*We perform 55–60 CS per month… with our effort their life is saved… These cases bring me satisfaction*." Skills utilization also appeared to buffer dissatisfaction with poor pay ($p = 0.020$), suggesting that professional fulfillment can partially offset other frustrations. Inversely, a study in the Philippines found that increasing pay, when working conditions remained poor, did not improve healthcare workers satisfaction (26). Ultimately, well-functioning hospitals may contribute to a positive feedback loop, improving both workforce satisfaction and staff retention in parallel.

Despite undergoing specialized training, AAs reported feeling stuck in low-level civil service positions with no formal post, limited pathways for promotion, and no regulatory recognition. This frustration was universally echoed across interviews and reflected in low satisfaction scores in the Opportunities for Promotion domain. Although a higher level cadre, MDGPs cited similar frustration around limited career opportunities, a significant barrier to rural retention nearly 20 years ago in 2008 (27). Further, permanent (Loksewa) staff were consistently more dissatisfied across nearly all domains ($p < 0.001$), similar to findings in the ASBA study (11). The absence of professional growth not only demotivates current AAs but deters future candidates from entering the field. The structural reality stands in sharp contrast to the swell of support and positive feedback from hospital staff, describing the AAs as essential to surgical services across settings. This mismatch must be addressed at the structural level to ensure that AAs are provided pathways to success as a reflection of their role on the ground, as described in a systematic review that found that task-shifting can be effective and affordable "*if accompanied by health system re-structuring"* (28). Similarly, another qualitative systematic review of midwifery, called for *"legal protections and liabilities and the regulatory framework"*, reiterating the need for systematic changes to support task-shifted cadres (29). Despite their strong intrinsic motivation, AAs face systemic barriers that threaten long-term retention and performance, similar to task-shifted cadres elsewhere (28, 30, 31). Addressing institutional shortcomings, including delayed supplies, bureaucratic rigidity, and lack of clarity in governance, is critical to sustaining this vital cadre and ensuring the resilience of Nepal's rural surgical system (28).

Although this study aimed to include as many AAs as possible, the response rate only reflected a portion of AAs in the field, limiting generalizability. Furthermore, only seven hospitals were selected for qualitative interviews. Given dramatically different environments and the impact they have on satisfaction, results should be interpreted with caution. Finally, AAs are a new cadre with evolving structures around their role, which may limit generalizability to other healthcare cadres that are more established, such as nurses or MDGPs. However, there may be useful insights to other new task-shifted cadres.

Conclusion

Anesthesia Assistants are a vital, task-shifted workforce supporting surgical access across Nepal's rural hospitals. They reduce geographic and financial barriers, enable emergency care, and are widely recognized by hospital teams for their contributions. While many find meaning in their work, systemic challenges including low pay, poor infrastructure, and lack of career growth limit satisfaction. These findings highlight the need for dual strategies that both sustain intrinsic motivation and address structural barriers. Strengthening institutional support and formalizing career pathways will be essential to protect and expand this critical cadre.

Abbreviations

AA Anesthesia Assistant

ASBA Advance Skilled Birth Attendant

CS Caesarean Section

CSSP Curative Service Support Program

CSV Comma Separated Values

CT Computed Tomography

ER Emergency

FGD Focus Group Discussion

HIC High Income Countries

HR Human Resource

ICU Intensive Care Unit

IDI In-depth Interview

JSS Job Satisfaction Survey

KII Key Informant Interview

LMIC Low and Middle Income Countries

MDGP Medical Doctorate in General Practice

MoHP Ministry of Health and Population

MSS Minimum Service Standard

NSI Nick Simons Institute

OPD Out Patient Department

OT Operation Theater

SAO Surgeon-Anesthesiologist-Obstetrician

Declarations

Ethical Consideration

The research was conducted in accordance with Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Participants. Ethical approval was obtained from the Nepal Health Research Council (reg no. 1002) based on National Ethical Guidelines for Health Research in Nepal and the administrative approval was taken from MoHP prior to conduction of the study (See supplemental materials). Written informed consent was taken from all the study participants. Voluntary participation was considered for the study. Data were de-identified prior to analysis to protect the privacy and confidentiality of participants.

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No potential conflict of interest was reported by the authors.

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Author Contributions

JP conceptualized the study, completed the initial literature review, and collected primary quantitative and qualitative data. JP analyzed and interpreted the qualitative data and developed descriptive statistics of the quantitative data with technical support from RR, RB and AK. AK cleaned and analyzed the data, completed the quantitative analysis and interpretation and created Figure 1. Triangulation was done by AK. JP drafted the first manuscript with support from BS. The manuscript was revised by AK, with support from JP, RR, AA, RB, ABK, MKS, SS. All authors reviewed and approved the final version of the manuscript.

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Figures

Figure 1. Job Satisfaction by Domain (n=88)

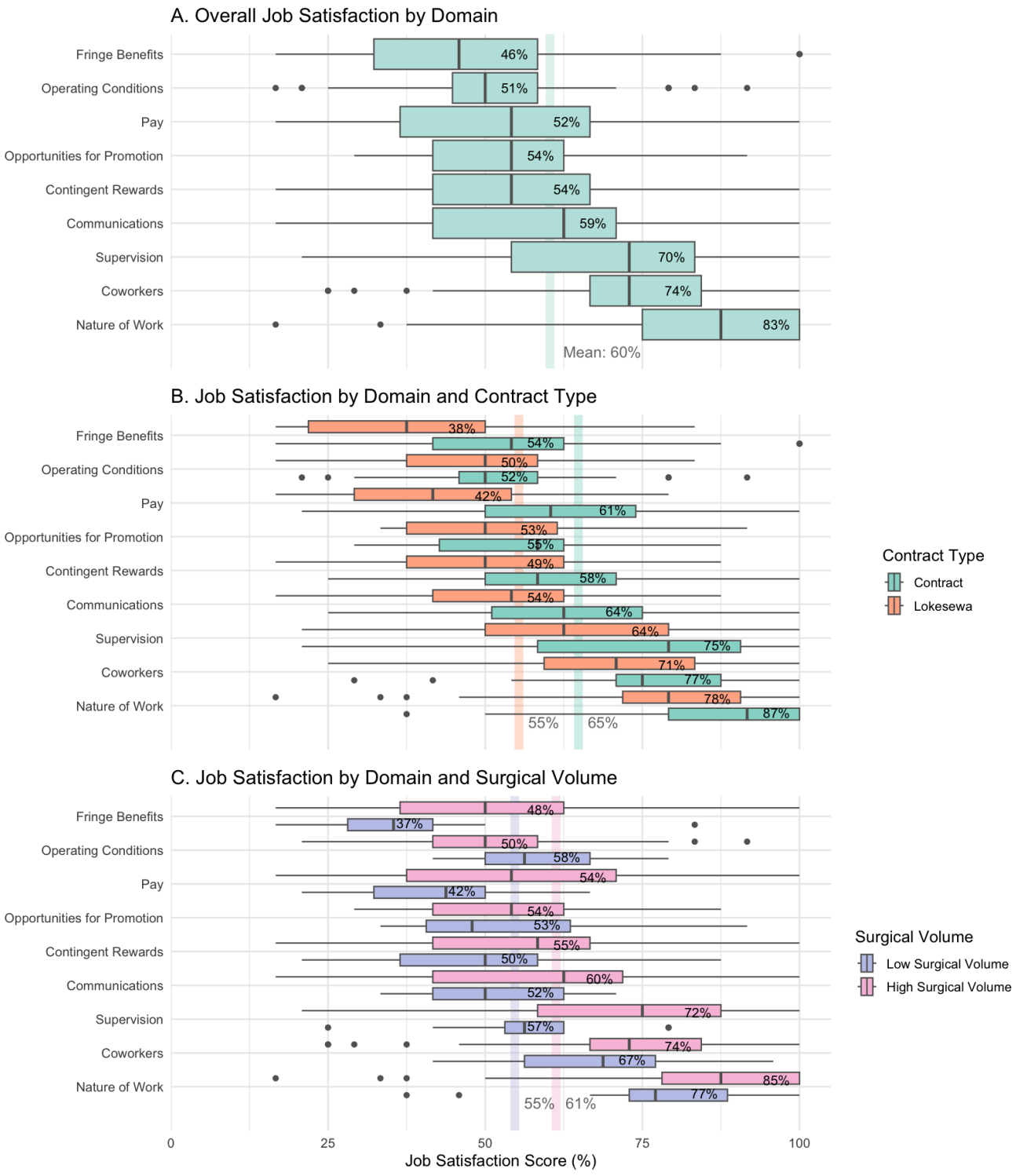


Figure 1

Job Satisfaction by Domain (n=91). A. Overall Job Satisfaction by Domain; B. Job Satisfaction by Domain and Contract Type; C. Job Satisfaction by Domain and Surgical Volume. Low surgical volume <10 major surgeries per year. All numbers show averages. Vertical lines show averages by color. Domains ordered from lowest to highest satisfaction.

Supplementary Files

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