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The pending loss of advanced life support paramedics in South Africa

Le départ futur des auxiliaires médicaux de soins avancés de réanimation en Afrique du Sud

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KEYWORDS

Paramedic;
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Abstract *Background:* In 2008 South Africa (SA) had 1631 registered advanced life support (ALS) paramedics to provide pre-hospital advanced life support care to a population of approximately 50 million. Compared to globally accepted ratios, the number of ALS paramedics in South Africa can be considered as grossly inadequate. This current shortage may be ascribed to migration. However, the extent and nature of this migration, the factors that have contributed to them leaving the country and the existence or effectiveness of implemented strategies that attempt to manage migration of SA ALS paramedic is not known for sure.

Methods: The study consisted of a two-phase mixed method descriptive survey. A subset of SA ALS paramedics made up the study population. Quantitative data (Phase One) was obtained from a web-based survey distributed to the accessible population ($N = 97$). Thereafter, qualitative data (Phase Two) was gathered through in-depth interviews with selected information rich participants ($n = 10$) also from within the accessible population. Through methodological triangulation, data from Phase One and Phase Two were integrated to obtain an in-depth understanding of South African ALS paramedic migration. In addition, the study investigated whether strategies that

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attempted to manage migration of SA ALS paramedics existed, and if they did, how effective have they been.

Result: Fifty-one of 97 (53%) ALS paramedics responded to the questionnaire in Phase One. Of those, 24 (47.1%) were found to be working inside South Africa, while 27 (52.9%) were working outside South Africa. Working conditions, physical security, and economic considerations were ranked as the top three major factors contributing to the decision or intended decision to migrate. Initiatives to manage the shortage of ALS paramedics in the public sector EMS do exist; however, it appears to be inadequate at its current rate of progress.

Conclusion: This study suggests that ALS paramedics in SA are leaving to find work outside the country because of working conditions, physical security, and economic considerations. The current measures to manage migration appear to be ineffective, indicating that new or additional strategies to manage migration of ALS paramedics in SA may be required.

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Abstract *Contexte:* En 2008, l'Afrique du Sud (AS) comptait 1 631 auxiliaires médicaux de soins avancés de réanimation (SAR) enregistrés administrant des soins avancés de réanimation préhospitaliers à une population d'environ 50 millions de personnes. Cette pénurie actuelle peut être attribuée à l'émigration. Cependant, l'ampleur et la nature de cette émigration, les facteurs qui ont incité ces personnes à quitter le pays et l'existence ou l'efficacité des stratégies mises en oeuvre afin de gérer l'émigration des auxiliaires médicaux de SAR en AS ne sont pas connus avec certitude.

Méthodes: L'étude a consisté en une enquête descriptive aux méthodes variées se déroulant en deux phases et employant des techniques de recherche à la fois quantitatives et qualitatives. La population de l'étude se composait d'un sous-ensemble d'auxiliaires médicaux de SAR étudiants. Grâce à une étude en ligne au cours de la première phase, qui a été suivie d'entretiens en profondeur avec des participants sélectionnés ayant permis de fournir une mine d'informations au cours de la deuxième phase, une compréhension approfondie de l'émigration des auxiliaires médicaux de SAR sud-africains a été obtenue. De plus, l'étude s'est penchée sur l'existence ou l'absence de stratégies visant à gérer l'émigration des auxiliaires médicaux de SAR sud-africains et, le cas échéant, sur leur efficacité.

Résultats: Cinquante et un des 97 (53%) auxiliaires médicaux de SAR ont répondu au questionnaire de la première phase. Sur ces derniers, 24 (47,1%) travaillaient en Afrique du Sud, alors que 27 (52,9%) travaillaient à l'étranger. Les conditions de travail, la sécurité physique et des considérations d'ordre économique ont été classées comme les trois premiers facteurs ayant influencé la décision ou la décision prévue d'émigrer. Des initiatives visant à gérer la pénurie des auxiliaires médicaux de SAR dans le SMU du secteur public existent, mais semblent cependant inadéquates au rythme actuel de leur progression.

Conclusion: Cette étude indique que les auxiliaires médicaux de SAR en Afrique du Sud quittent le pays afin de trouver du travail à l'étranger en raison des conditions de travail, de la sécurité physique et de considérations d'ordre économique. Les mesures actuelles visant à gérer l'émigration semblent être inefficaces, indiquant que des stratégies nouvelles ou supplémentaires visant à gérer l'émigration des auxiliaires médicaux de SAR en AS pourraient être requises.

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African relevance

- There is a growing and dire shortage of advanced life support (ALS) paramedics in South Africa (SA).
- SA ALS paramedics are leaving SA to find work outside the country.
- Jobs outside SA are usually short term contracts in developing African countries.
- No counter or control measures to SA ALS paramedic migration are locatable.
- Current measures to manage ALS paramedic shortages in SA appear to be inadequate.

What's new

- SA ALS paramedics most likely to migrate were individuals between the ages of 21 and 30.
- The gender of the ALS paramedic did not influence the decision to migrate.
- No single country attracted SA ALS paramedic migration more than any other.
- Working conditions, remunerations, and physical security contributed most to migration.
- As current measures to manage migration are inadequate new measures are needed.

Background

The role and subsequent value of pre-hospital advanced life support (ALS) has been a growing concern of emergency medical services (EMS) and government for many years.¹ The debate around the benefit of on-scene pre-hospital ALS versus rapid transportation to hospital still exists.² The one aspect that is consistent, however, is that the role and value of pre-hospital ALS is subject to the geography, health care needs, resources, and medical and social culture of the country involved.³ Countries with sophisticated health care systems with well-resourced health institutions served by an EMS able to attain short prehospital times are likely to challenge the value of providing prehospital ALS.⁴ In South Africa, however, the high rate of trauma,⁵ increased burden of poverty and communicable diseases,⁶ maldistribution of health care institutions and emergency facilities,⁷ and long pre-hospital times^{8,9} result in the growing need for prehospital ALS.¹⁰⁻¹²

Over the recent years, however, unpublished reports, anecdotal evidence and first-hand experience has indicated that there has been a growing shortage of ALS paramedics in SA.¹³⁻¹⁶ The shortages were believed to be a result of paramedics leaving SA to work in other countries; however, this could not be confirmed. In addition, little or nothing was known about this growing trend. This paucity in information and statistics became the premise for this study. These observations shaped the goals of this study, namely (1) determine the extent and nature of the migration of ALS paramedics from South Africa; (2) identify the factors that have contributed to their decision to work outside South Africa; and (3) investigate whether strategies that attempted to manage migration of SA ALS paramedics existed, and if they did, how effective have they been.

Methods

The study population

All 157 ALS paramedics who qualified between January 2001 and December 2006 with undergraduate diplomas in Emergency Medical Care (ND: EMC) from all SA institutions of higher learning (IHL) providing such programs made up the study population. The four IHL were: Cape Peninsula University of Technology (CUT) (23), Durban University of Technology (DUT) (61), University of Johannesburg (UJ) (67), and the Central University of Technology (CUT) (6).

Data collection

The study used a structured questionnaire to systematically collect data needed to describe the extent and nature of migration of SA ALS undergraduate paramedics. This was Phase One of the study. Phase Two involved the use of in-depth interviews with selected information rich subjects¹⁷ also from within the study sample to explain and provide clarity on responses recovered by the questionnaires in Phase One that were not completely clear. In addition, the National Human Resources Plan (NHRP): South Africa's proposed and already implemented initiative to manage ALS staff shortages in the public sector was appraised and its overall progress was evaluated.

Data collection tools

The questionnaire was developed specifically for this study. The first version of the questionnaire was pre-tested. It was distributed to five ALS paramedics within and outside South Africa. All five were known to the researcher as candidates rich in information; they were experienced in the SA EMS and were also capable of providing valuable input. This was done so that the instrument could be critically appraised with emphasis on its validity and reliability. The instrument was also peer reviewed and critiqued by the Durban University of Technology's Faculty of Health Sciences Research Committee which includes researchers with expertise in instrument development, a statistician¹⁸ and the study supervisors, who are considered experts in the field of research and in the South African EMS.

The questionnaire

The questionnaire was structured to have different sections to collect responses regarding; the total number of ALS paramedics that had migrated from SA, demographic data such as age, gender, work experience, type of work being performed and the type of migration they were engaged in, and the factors that had contributed to their decision or intended decision to migrate. Study participant contact details were obtained from the respective IHL and once informed consent was received participants were emailed the questionnaire. Once all questionnaires were received, responses recovered were reviewed. Responses that needed further explanation or clarity informed the semi-structured interview guide used in Phase Two.

The interviews

The individual interview method as opposed to a focus group discussion was chosen to provide protection for participants and to encourage them to speak candidly and freely. The semi-structured interview guide was set around that of gaining a detailed understanding of the factors and relationships between factors identified in the quantitative output from Phase One. Phase Two provided clarity and further explanations on responses from Phase One that were not immediately understood or explicit enough but also allowed the researcher to identify and separate individual factors and also compare and collapse together factors that were inherently the same but articulately differently.

Data analysis

Completed questionnaires were first read in its entirety. Responses were then reviewed and categories were formed. Certain categories were collapsed into each other to make one sufficiently descriptive collective category. This was done to make the worksheet more manageable. Categories were then grouped to form major factors. The categories or sub-factors as which they are also known as have been explicitly labeled to prevent the possibility of some responses which had been recovered from being diluted or lost. All categories were mutually exclusive. A number of measures were used to ensure that the researcher did not introduce his own bias during the development of the categories. The category labels used the actual words of the respondents. Only in a few cases were quotes

Table 1 Global distributions of SA ALS paramedics.

Developing countries	Total		Developing countries	Total	
	<i>n</i> (14)	%		<i>n</i> (13)	%
Angola	4	28.6	Australia	5	38.4
Democratic Republic of Congo	3	21.4	Canada	1	7.7
Guinea	1	7.1	Netherlands	1	7.7
Madagascar	3	21.4	Russia	2	15.4
Mozambique	1	7.1	United Arab Emirates	1	7.7
Namibia	1	7.1	United Kingdom	3	23.1
Tanzania	1	7.1	–	–	–
Total	14 (51.9%)	100.0	Total	13 (48.1%)	100.0

shortened to make them more manageable without losing the essence or nature of the comment or quote. Furthermore, many were the same as those used in the literature around HCW push and pull factors. In addition, both study supervisors checked the categories against the raw data. Responses were quantified for data analysis and processed through the Statistical Package for Social Sciences (SPSS) programme: Version 17. This process was supervised by the study supervisors and verified by an independent statistician.¹⁸

The NHRP

No initiatives aimed specifically at managing the migration of SA ALS paramedics from SA could be located. However, according to the National Human Resources Plan for health (NHRP),¹⁵ accelerating the training of lower level EMS personnel to the level of ALS was the solution proposed by the SA government to manage the shortages of ALS paramedics in the country. No reference is made to the possible causes of ALS paramedic shortages in the NHRP. Performance and progress reports for the NHRP, which were implemented at provincial level, could not be located for all nine provinces in South Africa. From those reports that were locatable, i.e., only three; the focus was moved to providing a detailed account of the need, impact and progress of the NHRP in managing staff shortages in KwaZulu-Natal; the then largest populated province in SA.¹⁹

Progress of NHRP in KZN

By comparing the number of actively employed ALS paramedics (this includes those paramedics employed but are away because of injury-on-duty status, absent from duty or on leave) with the number of people in a sub-district, the relative need for ALS paramedics was assessed. By comparing the percentage of staff trained to the level of ALS with the percentage target for a year, the progress of addressing staff shortages by accelerated training as implemented by the NHRP was assessed.

Results

The extent and nature of migration

More than half of the respondents were found to be working outside SA [24 (47.1%) inside SA versus 27 (52.9%) outside SA]. Of those working inside SA, 75% (18 of 24) intended

on migrating. Of the three distinct types of migration that were found to exist, namely; short term, temporary and permanent migration, 55% of all ALS paramedics working outside SA were engaged in short term contracts.

Significant differences existed in the distribution of age ($p = 0.035$), and years of experience post-graduation ($p = 0.007$); indicating that ALS paramedics most likely to migrate were individuals between the ages of 21 and 30 and those with less than 4 years post-graduation experience. Although the gender of the ALS paramedic did not appear to influence the decision to migrate from South Africa, two thirds (34) of the participants were male ($p = 0.017$).

No single country or group of countries were identified as being more attractive to the SA ALS paramedic (Table 1) however, there was an increased likelihood that ALS paramedics engaging in short term contracts would choose poorer or developing countries to work in and ALS paramedics choosing long term contracts would choose richer or developed countries to work in.

Factors contributing to migration

Two groups of major factors were found to exist. The first group referred to as major factors within SA that “pushed” ALS paramedics away and the second group referred to as major factors outside SA that “pulled” ALS paramedics towards international migration. These factors are ranked from most influential to least influential to the decision to migrate and are shown in Table 2. The categories represented by each major factor are shown in Table 3. Each category may represent either a push or a pull influence.

In addition, the relative ease, with which migration was possible, was found to be a catalyst to migration of ALS paramedics. It appears, in a situation uncharacteristic of international jobs; global recruiters and countries did not require professional registration for SA ALS paramedics while in host countries. In addition, the provision of accommodation, flights, visas and relative absence of bureaucratic barriers for global placements, together with the multitude of global vacancies for ALS paramedics may mean that SA ALS paramedics are not concerned with the decision to migrate, but rather the decision of when to migrate.

The NHRP – case study of KZN

The NHRP’s target for human resources for health production proposed that the national production of ALS paramedics

Table 2 List, ranking and percentage frequency distribution of push and pull major factors.^a

Push major factors		Pull major factors	
Ranking	%	Ranking	%
1. Working conditions	18.7	1. Working conditions	18.8
2. Physical security	14.9	2. Economic considerations	16.2
3. Economic considerations	14.2	3. Political considerations	12.0
4. Job security	11.2	4. Quality of life	12.0
5. Political considerations	10.4	5. Factors specific to the EMS	11.1
6. Statutory body	9.7	6. Physical security	10.3
7. Factors specific to the EMS	8.2	7. Education and training	8.5
8. Quality of life	8.2	8. Statutory body	6.0
9. Education and training	4.5	9. Job security	5.1
	100		100

^a Most influential factor is ranked at number 1 and the least influential at number 9.

Table 3 Categories within each major factor listed in Table 2.^a

Working conditions	Job security	Physical security
Work environment or work related facilities	Job availability	Crime
Respect from patients, clients	Prospects for promotion	High risk and exposure to violence at place at work
Respect and acknowledgment from community	Affirmative action policies, employment equity mandates, race quotas, etc.	High risk and exposure to infectious diseases at place at work
Professional respect and regard from other health care workers	Retrenchment, downscaling or staff replacement	
EMS industry specific	Economic considerations	Education and training
Management	Remuneration	Training standards within the profession
Appropriateness and adequacy of management	Savings, cost of living, interest rates, inflation	Education and training opportunities within the profession
Utilization of ALS staff	Incentives given to staff following company growth or increased profits	–
Financial gains versus patient care and welfare	Financial sustainability of the EMS, public or private	–
Appropriateness and allocation of responsibilities to ALS paramedics	–	–
Quality of life	Political considerations	Statutory body – PBEC
Opportunities to acquire better housing or vehicle	Racial discrimination	Administration processes regarding new or yearly registration
Roads, schools, hospitals, or places for recreation and rest	Gender discrimination	Administration processes regarding CPD
To live a decent life	Political instability	Proactive clinical governance
Family, friends, or social network in SA	Corruption, nepotism	Information or correspondence disseminated to members
–	–	Registration fees charged by the HPCSA

^a Each category may represent either a push or pull influence.

with undergraduate qualifications be 1000 annually.¹⁶ Considering that altogether only 157 ALS paramedics graduated nationally between 2001 and 2006 with a NDEMC, it may be safe to conclude that the NHRP’s target may be overly

ambitious especially as no new institutions offering the ND: EMC have been created or accredited as of 2010.

Tables 3 and 4 provide a description of the provision of emergency medical services in KZN.^{13,14,20} When comparing

Table 4 Distribution of EMS and status of ALS paramedics in KZN.

District	Population	ESVs (target)	ESVs (actual)	ESV (actual) to pop ratio	ALS paramedics (actual)	ALS paramedics vacancies
Amajuba	725,198	72	19	1:38,168	1	2
eThekweni	3,500,000	350	48	1:72,916	15	8
Ilembe	772,692	77	16	1:48,293	6	2
Sisonke	492,002	49	19	1:25,894	2	1
UGu	705,562	70	18	1:39,197	4	10
UMgungundlovu	995,030	99	18	1:55,279	9	13
UMkhanyakude	600,000	60	18	1:33,333	0	6
UMzinyathi	495,600	49	17	1:29,152	0	0
UThukela	770,000	77	19	1:40,526	0	3
UThungulu	902,820	90	25	1:36,112	3	6
Zululand	872,856	87	24	1:36,369	0	4
Total	10,831,760	1080	241	1:44,945	40	55

Table 5 Status of ALS paramedic distributions in KZN.

Number of ALS in KZN (target)	Number of ALS in KZN (actual)	Active vacancies	Ratio ALS paramedic: population (target)	Ratio ALS paramedic: population (actual)	Local staff with training to ALS (target) (%)	Local staff with training to ALS (actual) (%)
680	40	55	1:15,929	1:270,794	5	2.1

the target set of 1 ALS paramedic to a population of 15,929 population (Target ALS/population of KZN) the number of ALS paramedics available to the KZN population is evidently inadequate (1:270,749).

In the case of the NHRP and its goal of accelerating training of EMS personnel, an annual goal of training 5% of local staff to the level of ALS was set. According to the KZN Emergency Medical Services Annual Report,²⁰ only 2.1% of local staff were trained to the level of ALS in 2007. This amounted to a 42% success rate (Table 5).

By way of illustration, the impact made by the NHRP in accelerating training of local staff to the level of ALS in KZN, is presented. Based on the staffing norm of 10 ECPs per Emergency Service Vehicle (ESV) providing a 24 h service,¹⁵ KZN should have 2410 staff available to work on ESVs according to figures extrapolated from the annual review (see Table 3 – 241 ESVs multiplied by 10 staff per ESV). For ease of presentation, all 2410 staffs are shown as eligible for training to the level of ALS. In reality this will not be the case as many of the ESV staff do not have the minimum requirements to proceed to ALS training, i.e., they may be at the level of an ECP Basic or Intermediate and not have a thousand hours experience.²¹ The goal of training 5% of local staff (2410) annually means that it would take approximately 5.6 years to reach the target of 680 ALS paramedics. At the current success rate of 2.1%, the number of years increases to 13.4 years.

Study limitations

A total of 46 ALS paramedics from the accessible population who had agreed to participate in the study did not return the study questionnaire. This amounted to a no response rate of 47.4%. The restriction of the research to a sample of paramedics and a specified data collection time frame was necessary for this specific study and its objectives but it may have also

presented as a limitation. Further research comprising a larger group of SA ALS paramedics investigated over a longer data collection time frame to improve response rates is needed.

Conclusion

This study suggests that undergraduate ALS paramedics in SA have left and intend leaving SA to find work outside the country. Many push and pull factors may influence their decision to migrate however, it appears that factors around working conditions, physical security, and remunerations may be of most influence. Currently no measures are in place to actively manage the continued outflow of ALS paramedics from SA. While initiatives to manage the shortages of ALS paramedics have been proposed and in some instances implemented, i.e., accelerating training of lower level staff within the EMS to the level of ALS; these appear to be inadequate, indicating that new or additional strategies to manage the shortages and the migration of ALS paramedics in SA may be required.

Author contributions

Mr. Govender is currently working as a Critical Care paramedic in Qatar (UAE). He is completing a Ph.D.: Emergency Medicine at UCT in South Africa.

Dr. Linda Grainger was the supervisor for the study and also a contributory author. Her contribution to the study included and was not limited to auditing and validating the research design and the research process. Dr. Grainger is the chief editor at Occupational Health South Africa. She specialises in education, research and clinical practice in occupational health and publishing.

Mr. Raveen Naidoo was the co-supervisor for the study and also a contributory author. His contribution to the study included and was not limited to providing technical

information specific to the South African Emergency Medical Service. Mr. Naidoo is the current chairman for the Professional Board for Emergency Care at the Health Professions Council of South Africa.

Dr. Russell MacDonald is an Associate Professor and Co-Director of the Emergency Medicine Fellowship Program at the Department of Medicine, University of Toronto in Ontario, Canada. Dr. Russell assisted in proofing and isolating content within the dissertation for publishing.

Conflict of interest statement

The author hereby declares that the content of this research project is by the authors own unaided original work, except where specific indication is given to the contrary (by reference). This work has not been previously submitted to the Durban University of Technology or any other university. No conflict of interest exists with any of the contributing authors and the examples of potential conflicts of interest as presented on www.elsevier.com/conflictsofinterest.

Appendix. Short answer questions

Test your understanding of the contents of this original paper (answers can be found at the end of the regular features section).

- What percentage of respondents was found to be working outside SA?
 - 20.3%
 - 52.9%
 - 85.6%
 - 90%
 - 100%
- Ranked from most influential to least influential, what push factors contributed to ALS paramedics migrating from SA?
 - (1) Working conditions (2) Physical security (3) Economic considerations
 - (1) Working conditions (2) Statutory body (3) Quality of life
 - (1) Physical security (2) Working conditions (3) Factors specific to the EMS physical security
 - (1) Working conditions (2) Education and training (3) Quality of life Physical security
 - (1) Job security (2) Quality of life (3) Physical security
- Accelerating the training of lower level EMS personnel to the level of ALS has proven to be adequate in managing the shortages of ALS paramedics in KZN – South Africa.
 - True
 - False

References

- Spaite D, Criss E, Valenzuela T, Meislin H. Prehospital advanced life support for major trauma: critical need for clinical trials. *Ann Emerg Med* 1998;**32**(4):480–9.
- Eckstein M, Chan L, Schneir A, Palmer R. Effect of prehospital advanced life support on outcomes of major trauma patients. *J Trauma Inj Infect Crit Care* 2000;**48**(4):643–8.
- MacFarlane C, Benn C. Evaluation of emergency medical services systems: a classification to assist in determination of indicators. *Emerg Med J* 2003;**20**:188–91.
- Stiell I, Nesbitt L, Pickett W, Munkley D, Spaite D, Banek J, Field L, Luinstra-Toohey L, Maloney J, Dreyer J, Lyver M, Campeau GOSG, Wells GOSG. The OPALS Major Trauma Study: impact of advanced life-support on survival and morbidity. *Can Med Assoc J* 2008;**178**(9):1141–52.
- Plüddemanna A, Parrya C, Donsonb H, Sukhaib A. Alcohol use and trauma in Cape Town, Durban and Port Elizabeth, South Africa: 1999–2001. *Inj Control Saf Promot* 2004;**11**(4): 265–7.
- Health Systems Trust. *South African Health Review. STIs, HIV and AIDS and TB: progress and challenges*. Durban: Health Systems Trust; 2008.
- Padarath A, Chamberlain C, McCoy D, Ntuli A, Rawson M, Loewenson R. Health personnel in Southern Africa: confronting maldistribution and brain drain. EQUINET Distribution Paper Number 3 EQUINET, Health Systems Trust (Southern Africa) and MEDACT (UK); 2000.
- Health Systems Trust. *The National Primary Health Care Facilities Survey*. Available from: < www.hst.org.za/uploads/files/nphc2000.pdf >; 2000 accessed on 02.01.10.
- Moodley J, Pattinson. *Saving mothers report on confidential enquiries into maternal deaths in South Africa*. Available from: < <http://www.doh.gov.za/docs/reports/mothers/kzn.html> >; 1998 accessed 12.12.09.
- Smith R, Conn A. Prehospital care – scoop and run or stay and play? *Injury* 2009;**40**(4):S23–6.
- Ryynänen O, Iirola T, Reitala J, Pälve H, Malmivaara A. Is advanced life support better than basic life support in prehospital care? A systematic review. *Scand J Trauma Resusc Emerg Med* 2010;**18**(11):62.
- South African Qualifications Authority. *Qualifications and unit standards database. National Learners Records Database*. Available from: < <http://allqs.saqqa.org.za/showQualification.php?id=63129> >; 2008 accessed 02.01.10.
- Boaz H. (Harold Boaz < boazh@ananzi.co.za >). 15 December 2008 (Team Leader: Central Control Centre for Emergency Medical Rescue Services KZN). Formal request for information from EMRS for research purposes: RE: Actively employed ALS paramedics per sub-district in KZN. E-mail Govender, P. (kevin.govender@yahoo.com) accessed 15.12.08.
- Finlayson M. (Melissa. finlayson@kznhealth.gov.za). 12 November 2008. (Principal Technical Advisor: Emergency Medical Rescue Services KZN). Formal Request for information from EMRS for Research purposes: Re: Vacant ALS posts per district in KZN. E-mail Govender, P. (kevin.govender@yahoo.com) accessed 12.11.08.
- Naidoo Y. Work motivation amongst public sector emergency care practitioners in the uMgungundlovu Health District of KwaZulu-Natal. Unpublished MBA dissertation. Durban: Regent Business School; 2006.
- South Africa, Department of Health. *Is healthcare adequate to take care of all of us? NHRP: Human resources in the South African Health Care System: A rapid Appraisal*. Available from: < http://www.doh.gov.za/docs/discuss/2006/hrh_plan/chapt2.pdf >; 2008 accessed 14.12.10.
- Polit D, Beck C. *Essentials of nursing research – methods, appraisals and utilization*. 6th ed. Philadelphia: Lippincott, Williams and Wilkins; 2006.
- Singh D. (Singhd@dut.ac.za). 08 June 2009 (Snr Lecturer of physics at the Durban University of Technology and study appointed statistician). Re: Study instrument tests: reliability and validity testing and factor analysis. E-mail and attachment to Govender, P. (kevin.govender@yahoo.com).
- Statistics South Africa. *Migration and urbanization in South Africa*. Pretoria: Statistics South Africa; 2006.

20. KwaZulu-Natal Department of Health. Emergency Medical Rescue Services Annual Report 2007. Pretoria. Available from: <<http://www.kznhealth.gov.za/ar0607/PARTB4.pdf>> ;2007 accessed 12.02.08.
21. Naidoo Y. (yugan.naidoo@kznhealth.gov.za). 05 February 2008 (Principal: KwaZulu-Natal College of Emergency Care and HPCSA appointed CPD accreditor). RE: History and development of EMRS. E-mail Govender, P. (kevin.govender@yahoo.com) accessed 05.02.08.