

FACTORS ASSOCIATED WITH ON-TIME GRADUATION OF MPH
STUDENTS AT THE SCHOOL OF PUBLIC HEALTH, UNIVERSITY OF THE
WITWATERSRAND: 2000-2008

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DECLARATION

I, Ahmed Eltonesi Mohamed, declare that this research report is my original work. It has not been submitted before for any degree or examination to this or any other university.



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ABSTRACT

Introduction: Low throughput rates are a concern for higher education institutions nationally. Within the postgraduate Master of Public Health programme in the School of Public Health at the University of Witwatersrand, throughput rates have been identified as a key priority area for improvement.

Aim: This study described on-time graduation of Master of Public Health students at the School of Public Health, University of the Witwatersrand from 2000 to 2008. In addition, it examined the associations between factors such as socio-demographic characteristics, mode of registration, and supervision characteristics and on-time graduation in the same period. Finally, the study aimed to describe the quality of information that is used to measure throughput in the School of Public Health.

Results: Frequency analyses of throughput data obtained from the University's Academic Information and Systems Unit indicated that, of the 223 students in the sample, 65% (144 students) graduated, while 35% (79 students) did not. Of the 144 students who did graduate, 121 students (84%) did so on-time, and 23 students (16%) did not graduate on-time. Fisher's exact test showed no association between socio-demographic factors age ($p=0.46$), race ($p=0.79$), sex ($p=0.65$), nationality ($p=0.32$), and on-time graduation. Mode of registration: part-time or full-time ($p=0.37$); number of supervisors ($p=0.72$); and Wits supervisors vs. non Wits supervisors ($p=0.60$) were not associated with on-time graduation. However, the study did raise concerns regarding the information system at the university, specifically the quality of data and limited monitoring and evaluation processes to monitor student progress.

Conclusion: More than a third of students registered for a Master of Public Health during the period 2000-2008 did not graduate. Given the human resource needs in health and health services in sub-Saharan Africa this represents an inadequacy. There were no significant associations between students' socio-demographic factors, mode of registration, supervision related factors and either graduation or on-time graduation. The quality of the current information system is not optimal to measure student progress and to flag students

who have missed key milestones. There is a need for further studies to improve the information system for the purposes of optimally tracking students' progress.

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CONTENTS

DECLARATION.....	ii
ABSTRACT.....	iii
ACKNOWLEDGEMENTS	v
LIST OF FIGURES.....	viii
LIST OF TABLES	viii
ACRONYMS.....	ix
DEFINITIONS.....	x
CHAPTER 1: INTRODUCTION.....	1
1.1 Background	1
1.2 Master of Public Health Degree, University of the Witwatersrand.....	3
1.3 Literature Review.....	5
1.3.1 Completion of post-graduate degrees	5
1.3.2 Factors related to completion of studies.....	8
1.3.3 Socio-demographic characteristics associated with completion of studies.....	10
1.3.4 Cumulative effects of delays in completion	11
1.3.5 Mode of registration	12
1.3.6 Supervision.....	12
1.3.7 Information system and monitoring students' progress.....	15
1.3.8 Problem Statement.....	17
1.3.9 Justification for the Study	18
1.3.10 Aim of the Study	18
CHAPTER 2: METHODOLOGY.....	19
2.1.1 Study Design	19
2.1.2 Study Setting	19
2.1.3 Study Population.....	20
2.1.4 Sample	20
2.1.5 Data Extraction and data source.....	20
2.1.6 Measurement	21
2.1.7 Data Processing and Analysis.....	21
2.2 Ethical Considerations	23
CHAPTER 3: RESULTS.....	24
3.1 Introduction	24

3.2 Socio-demographic characteristics, mode of registration and supervisor-related factors of the MPH students	24
3.3 Academic outcomes of MPH students registered 2000-2008	26
3.4 Factors associated with graduation	26
3.5 Factors associated with on-time graduation.....	28
3.6 Quality of data and information systems.....	31
CHAPTER 4: DISCUSSION	33
4.1 Introduction	33
4.2 Completion of post-graduate degrees.....	33
4.3 Factors related to completion of studies	34
4.4 Socio-demographic characteristics associated with completion of studies.....	34
4.5 Mode of registration	35
4.6 Supervision	36
4.7 Information Systems and Monitoring Student Progress.....	37
4.8 Limitations.....	38
CHAPTER 5: CONCLUSION AND RECOMMENDATIONS	39
5.1 Recommendations	39
REFERENCES.....	41
APPENDIXES	50
Appendix A: Data extraction sheet.....	50
Appendix B Permission from AISU to use the data.....	51
Appendix C Ethics clearance	52

LIST OF FIGURES

Figure 1.1 Jiraneck's Dissertation Research (DR) Completion Triangle, 2010	Error! Bookmark not defined.
Figure 1.2 Latona and Browne Model	10

LIST OF TABLES

Table 1.1 Enrolment and graduates of Master student in South Africa 2009 -2014.....	6
Table 2.1 Data analysis plan by study objective.....	22
Table 3.1 Socio-demographic characteristics of students registered between 2000 and 2008	18
Table 3.2 Academic outcome	Error! Bookmark not defined.
Table 3.3 Socio-demographic characteristics by students' graduation status	Error! Bookmark not defined.
Table 3.4 Association between socio-demographic and on-time graduation	Error! Bookmark not defined.

ACRONYMS

AISU:	Academic Information and Systems Unit
ASSAf:	Academy of Science of South Africa
DPH:	Diploma in Public Health
FT:	Full Time
GDP:	Gross Domestic Product
HOMA:	Hospital Management
HSP:	Health Systems and Policy
MCH:	Maternal and Child Health
MPH:	Master of Public Health
NPC:	National Planning Commission
NPHE:	National Plan on Higher Education
OECD:	Organization for Economic Co-operation and Development
OH:	Occupational Hygiene
PT:	Part Time
RH:	Rural Health
SA:	South Africa
SADC:	Southern African Development Community
SBCC:	Social and behaviour change communication
SPH:	School of Public Health
Wits:	University of the Witwatersrand

DEFINITIONS

Attrition: the reduction in student population who, for one reason or another, has dropped out of a study programme.

Cohort: students who first registered for a particular programme in an academic year and whose progress towards that qualification is subsequently tracked.

Continuing: defined as those who, at the beginning of the academic year, were still active in the university system and had not dropped out or graduated.

Completion: students who, within a certain time period, have completed their qualifications.

Drop-out: students who have neither graduated nor returned to re-register for the following year of study.

Graduates: students who, having met all the academic requirements, have passed the total course work and research components and have obtained their degrees.

Graduation rate: the proportion of students (head count) for a particular degree who graduate out of the total number enrolled in that particular year.

Non-completion rate: the proportion of students who have failed to complete the degree, out of the total number enrolled in that particular year.

On-time graduation: those students who, having met all the academic requirements, have obtained their degrees within the prescribed time frame.

Pile-up: the state of affairs where students remain enrolled for their degree for much longer than expected (or desirable).

Progression rate: the proportion of students who re-register for a further degree after having completed their initial degrees.

Retention rate: the proportion of students registered one year who return the following year out of the total number enrolled in that particular year.

Success rate: proportion of full-time equivalent credits earned out of students enrolled.

Time-to-degree: the number of academic years enrolled between the time of entering a university programme and completion of the degree.

Throughput: the number of first-time entry students of a specific cohort who have graduated, either within the minimum time, or up to two years beyond the minimum time.

CHAPTER 1: INTRODUCTION

1.1 Background

The rates at which students complete their postgraduate studies have drawn increasing attention from governments and educational institutions globally. This interest has piqued because postgraduate students in high and middle- and low income countries experience problems that either delay their studies (Wingfield, 2011), or prevent them from completing on-time (Amehoe, 2013). A number of governments recognise the relationship between post-graduate research and economic development. Therefore, it is not surprising that institutions have focused their attention on identifying factors that affect attrition rates, completion rates, time-to-completion and the quality of postgraduate supervision (Latona & Browne, 2001).

At the institutional level, on-time graduation and throughput rates are important indicators of institutional performance and ranking. Low throughput rates may result in a negative perception of an institution's image, loss of money and time, and lower levels of self-confidence among students and graduates (Amehoe, 2013).

In South African universities, throughput is regarded as a national priority (Watson, 2008), the reasons for prioritization range from the need to improve the overall performance of the education sector in terms of cost efficiency and investments in human resources, to national skills development. The National Ministry of Education (2001) outlined that higher education has a key role to play in ensuring the development of knowledge, skills and research capacity of South Africans.

While the number of students who have entered universities, either for undergraduate or postgraduate studies has increased post-apartheid (1994) in South Africa (SA), there has not been an accompanying increase in graduates in the same time period (Letseka & Maile, 2008). Furthermore, despite the importance of the quality and quantity of post-graduate throughput rates to South Africa's knowledge and skills development, research into throughput rates and associated factors is limited in the South African context. The

reasons for the paucity of research include the lack of reliable data, lack of transparency about throughput rates, and an attempt to mask under-performance at higher education institutions (Mouton, 2007). Yet, the need to examine on-time completion at the post-graduate level has become a growing concern for South African universities (Frouws, 2007).

To address this issue, some models, for example Jiranek (2010 and Latona and Brown (2001), have been adopted to explain the factors associated with the successful and timely study-completion of students in research programmes (Latona & Browne 2001; Lessing & Lessing, 2004). Many studies have identified the factors that are associated with on-time completion in different contexts, such as student-related factors, institution-related factors, and supervision-related factors.

Lessing and Lessing (2014) outlined institutional factors such as supervision, accessible administrative procedures and student factors such as understanding academic and scientific requirements as factors influencing completion time. Wei, & Ramalu, (2011), added the quality issues of the institutional services as a predictor for completion of studies, the service provided for students have to be well-managed and fits the students' needs, the satisfactory of these services will lead students to achieve a better quality of studies and help them to complete within the timeframe. Humphrey and McCarthy (1999), identified adequate facilities, financial support and demographic factors. Delays in post-graduate completion can be the result of personal circumstances, distance from campus and financial constraints on students Botha, (2017). Mackinnon (2004) summarised the personal, professional and organizational factors as influences on completion time, whereas Chowdhury, (2014) defined the macro and microenvironment and students resources as influences of completion.

The completion of Master of Public Health (MPH) degrees is particularly relevant in low and middle income countries (Zwanikken et al., 2014). In the South African context there is a need for additional human resources to meet the health needs of the population (Zwanikken et al. 2014; Dlungwane & Knight, 2016).

There are at least 10 higher education institutions that offer a MPH degree in SA. The demand for a MPH degree exceeds the number of students that these programmes can accommodate (Dlungwane et al., 2017). Between 25-60% of students who entered MPH programmes completed their studies and the time to completion is estimated to be between four to five years (Dlungwane et al., 2017). Understanding the factors associated with graduation and on-time graduation at the University of the Witwatersrand could potentially inform the selection and support mechanisms for students.

1.2 Master of Public Health Degree, University of the Witwatersrand

The University of the Witwatersrand falls under the jurisdiction of the National Department of Higher Education in SA (WITs, 2017). Improving throughput rates of all programmes at undergraduate and postgraduate level remains firmly on its agenda and filters down to the mandates of individual Faculties and Schools. While routine throughput reports detail throughput rates at the faculty level, the reports offer limited insight into issues that are related to the reasons for low throughput (WITs SPH, 2015).

Within the School of Public Health (SPH) where this study was located, there has been a great concern to increase the number of students who graduate on-time over recent years (WITs SPH , 2009).

Alternatively, the decrease in the number of students who graduated on-time will have a negative impact on the SPH. For instance, as the number of students who remain in the system increases, so does the supervisory capacity that is needed, resulting in a large workload and a backlog of students who are already in the system. In addition, the university only receives a subsidy for students who graduate on-time. Subsidy policy or incentive funding for postgraduates was introduced by SA to meet an urgent national need for more high-level skills, the idea is the Universities getting paid for research output and graduated students (ASSAf, 2006). Therefore, a delay in the graduation of students means that there is a loss of this subsidy. Furthermore, administrative burdens, workload burden on teaching staff and administrators, as well as the difficulties in co-coordinating and

supervising a large number of students impacts negatively on overall performance(Council on Higher Education, 2009).

On a larger scale, poor postgraduate throughput affects a country's critical human resource needs, University and student's resources. Therefore, ensuring successful and timely completion of the MPH and other postgraduate degree remains an important objective for the SPH (SPH Executive Report, 2009).In terms of the course completion versus research completion, throughput reports indicate that most students complete their coursework on-time, while the research component causes the "bottleneck" (SPH Executive Report 2009).

The MPH programme was introduced in 1998, with the aim of graduating capable public health practitioners with the skills and knowledge required to understand and deliver effective public health programmes (SPH, 2015). The programme seeks to prepare its graduates to address public health problems at regional and national level. The MPH programme offered candidates a choice of specialization in the fields of Health Systems and Policy (previously health management and systems) (HSP), Hospital Management (HOMA), Occupational Hygiene (OH), and Maternal and Child Health (MCH) during the period of this report.

Following student bottlenecks during the early years of implementation, the MPH programme initiated a biennial year intake in 2008.This is dependent on the targeted number of appropriate students who have applied, the throughput rates, and staff capacity.

The degree comprises three components:

- Part I comprises six foundational public health courses;
- Part II comprises six field-specific courses related to the candidate's field of specialization, and
- Part III comprises a research project, the completion of empirical research on a topic related to a chosen field of specialization

The programme is offered as a full-time (FT) degree over two years or a part-time (PT)

degree over four years. The Faculty of Health Sciences' Standing Orders, which govern the minimum period of study, allow an additional year for completion for FT and PT students. This means that a candidate registered for a FT programme has two years plus one additional year and a PT candidate has three plus one additional year in which to complete a degree on-time (Faculty of Health Sciences, Rules and Syllabuses, 2010).

The SPH offered a Diploma in Public Health (DPH) with the requirement being that the student completes coursework without the research component. However, students who do well in the DPH programme (until recently) were granted the opportunity to upgrade to a MPH, where the research component is a requirement.

This study was conducted in the SPH at University of the Witwatersrand University (WITs). It sought to examine student throughput and on-time completion of the MPH degree at the SPH. In addition, the study examined the association between students' socio-demographic characteristics, mode of registration and supervision related factors and on-time graduation.

Information system related data quality issues and efficient tracking systems to monitor the progress of MPH students at the University of Witwatersrand are discussed as an emergent issue in this research report.

1.3 Literature Review

1.3.1 Completion of post-graduate degrees

The decline in higher education degree completion rates and the increase in time-to-degree is a recent global trend (Abiddin, Ismail, & Taniredja, 2016; Amehoe, 2013). Bound et al. (2007) found that, despite the increase in university registrations, the completion of degrees is disproportionate to enrolments; this is supported by other research examining on-time completion (Sayed, Kruss & Badat 1998; Frouws, 2007; Amehoe, 2013; Holdaway, Deblois, & Winchester, 1995; McCormack, 2005; Amehoe, 2013).

In the Netherlands, McCormack (2005) reported that only 12% of PhD students complete

their studies on-time. Similarly, a Canadian study illustrated that several educational institutions expressed concerns about problems with postgraduate education and students taking longer than the time allowed to complete their research (Holdaway, Deblois, & Winchester, 1995; Amehoe, 2013). A study in United Kingdom, found that when too many students enter the higher education system, they fail to obtain a degree; statistics reported consistently high attrition rates and increasing time-to-completion (Yorke & Longden, 2004) In SA throughput has become a subject of interest in a small but emerging body of research. While access and student throughput are important considerations in SA, it is believed that more attention has been focused on access (Frouws, 2007). In SA, the need to produce qualified human resources pushed the government to increase the number of University's enrolled students each year (Thaver, Holtman & Julie, 2013).

Between the years 1990 and 2005, enrolment in SA increased from 385,700 to 715,800 and the number of graduates was 56,744 (15%) and 120,385 (17%) respectively (Scott, 2009). Between 2009 and 2014 there was increase in the enrollments while the percentage of students graduated remained around 20% (South African Higher Education, 2015)

According to the National Planning Commission - NPC (2012), SA is under pressure to produce post-graduates. This is due to the fact that the NPC envisages SA moving from a resource-based to a knowledge-based economy (National Planning Commission, 2013).

According to the Academy of Science of SA (ASSAf), the situation in SA needs greater attention and the appropriate interventions are required in order to increase the number of postgraduate students (ASSAf, 2010). In 2007, SA produced 1,274 PhD graduates or 26 per million (0, 0026%) of population (this decreased to 1182 (0, 0024%) in 2008. This is in comparison to Australia with 264 per million (0.026%), Portugal with 569 per million (0.057%) and Brazil with 42 per million (0.0042%) of population respectively. The comparisons show that South African tertiary institutions appear to be lagging behind those in both developed and developing countries (Cassim, 2014).

In a study conducted on a selected number of former Technikons in SA, only 21% of the students completed their studies within the allocated time frames (Center for Higher Education, 2010). The number of qualifications awarded for the year 2004 was 6% of total students registered, in 2005 was 12%, and in 2006 was 37% (Frouws, 2007). More recent results documented by the Department of Higher Education in table 1.1. The average graduation for the Master degree in SA for the period 2009 - 2014 was 20% as shown in table 1.1. There has been an increase in the proportion of students enrolled in Masters programmes between 2009 and 2014. However, in 2014 only one in five Masters students graduate (Centre for Higher Education Trust, 2015).

Table 1.1 Enrolment and graduates of Master student in SA 2009 -2014

Master degree in South African universities	Enrolment	Graduated	%
2009	43723	8112	18.6%
2010	46699	8633	18.5%
2011	48873	9690	19.8%
2012	49561	10334	20.9%
2013	52217	10809	20.7%
2014	53675	11627	21.7%

Source: South African higher education, higher education performance indicator data 2009 to 2014 (Centre for Higher Education Trust, 2015).

In other research, Yorke and Longden, (2004) found that about 15% of the students registered in the public higher education system in SA drop-out before they graduate, while only 14% complete their qualifications.

Similarly, Sayed and colleagues (1998) found that in 1998 only 10% of Masters students completed their research on-time at the University of the Western Cape in South Africa. Another study by the University of Stellenbosch revealed that the annual postgraduate completion throughput rates varied between 11 and 14% for doctoral students and between 21 and 24% for Masters students (Amehoe, 2013). Overall, the throughput rates among post graduates, in particular in SA, have been below optimal.

1.3.2 Factors related to completion of studies

The international literature on factors responsible for completion and non-completion in throughput studies is extensive (Stoop, 2015; Manathunga, 2005; Seagram, Gould and Pyke, 1998; Sheridan, and Pyke, 1994; Jiranek, 2010; Bourke, Holbrook; Wadesango, and Machingambi, 2011; McCormack, 2005; Amehoe, 2013). These range from personal to academic factors, personal factors are those related to the socio-demographic profile of students, such as: age, gender, race, nationality, marital status and employment status. Academic factors include PT or FT enrolment status, supervision, and number of supervisors who supervise the student, information system-related quality issues, and tracking systems to monitor students' progress. Evidence suggests that factors related to postgraduate throughput in a university context include student commitment and academic background, research writing skills and supervision (Amehoe, 2013; Frouws, 2007; Sonn, 2016)

Lessing & Lessing (2004) identified that a student-friendly environment at the institution, excellent administrative support from the faculty, and strict entry requirements such as multiple mini Interviews as a selection instrument for postgraduate admissions, applicants interviews for academic records and non-academic ability such as acceptance of responsibility, employment commitment, number of independence and evidence of motivation can influence on-time completion of students, Amehoe, 2014 proposed entrance examinations beside the interviews as selection tools, to identify area of weakness e.g., students inadequate research skills, second language problems, weak writing skills and poor analytical skills, the presentation of a draft proposal indicating a research area or topic, a literature review, and the proposed research method for preliminary screening before they are admitted into postgraduate research programmes, he added students entering with a first or upper second class honours degree are more likely to finish than those with other (lower) entry qualifications (Amehoe, 2013).

All these factors, either in isolation or in combination, play a key influencing role in throughput rates of students during their postgraduate degrees. It is clear that on-time graduation is complex.

Many models have been utilised to summarise the factors associated with completion time. Jiranek's Dissertation Research Completion Triangle is premised on factors that predict early completion or otherwise of masters' and doctoral research. These factors, according to the literature, include student qualities and personal situation, supervision, the scholarly environment and the availability of research facilities and resources (Jiranek, 2010).

Figure 1.1 Jiranek's Dissertation Research (DR) Completion Triangle, 2010

Similarly, Latona and Browne (2001) developed a framework of three important factors that predict whether students are likely to complete their studies on-time or not. In keeping with Latona and Browne's Model, a quantitative study emerged from the University of the Cape Town on the success rates of graduate students. The study found that factors that affect students' success rates range from administrative inefficiencies and academic factors to economic, health, social and personal factors (Latona& Browne, 2001).

For the purpose of this study factors outlined by Latona& Browne model was modified into academic factors such as mode of registration, socio-demographic factors and supervisors factor instead of the administrative inefficiencies or institutional factors, which we could assume supervision in a way or another has some relation with the administrative rules and institutional polices in terms of incentives motivation and load of work and the way of recruitment for non-Wits supervisors.

Student-related factors included socio-demographic factors. Supervisor factors include the number of supervisors allocated to a single student, and whether the supervisor is a FT University staff member or not, academic factors include the mode of registration (PT or FT). Therefore, Latona and Browne's Model is fitting for this study because the model

includes student's factors, academic factors, and supervision-related factors. The fourth factor in this model which is administrative inefficiencies was not included in this study, adaptation of Latona and Browne's Model, for the purposes of this study, is shown in Figure 1.2.

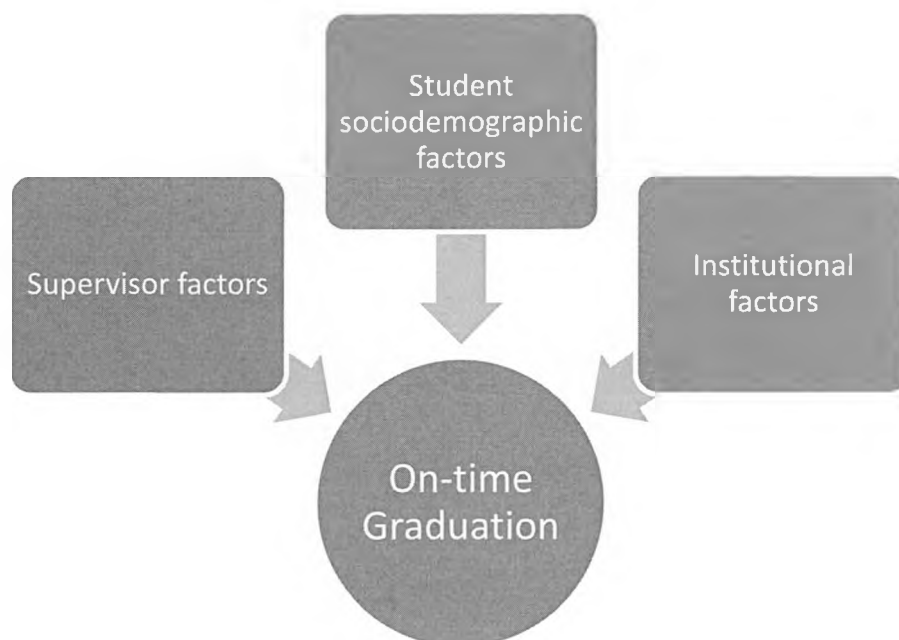


Figure 1.2 Adapted from Latona and Browne Model

1.3.3 Socio-demographic characteristics associated with completion of studies

Research shows that, globally in higher education, there is a variation in the number of men and women who graduate, for example, in Organization for Economic Co-operation and Development (OECD) countries, the gender gap in favour of women is especially wide in Iceland, Poland and the Slovak Republic more women are anticipated to obtain university-level qualifications than men based on 2013 graduation rates. In Germany, Mexico and Switzerland, graduation rates between the sexes are balanced. In contrast, Japan and Turkey, see more men graduate from university-level education (Vincent-Lancrin, 2008). In a study by Scott (2005) in New Zealand women were shown to be more likely to successfully complete a tertiary qualification than men. Price (2006) found that female students required more time than male students to complete their studies. In contrast, Martin, Maclachlan and Karmel (2001) argued that in Australia female students

were equally or even more likely to complete their studies than males. In South Africa there is no literature found to show the gender differences in time to complete postgraduate studies, Sondlo (2014) argued the responsibilities of married women in African context, where women are more likely to drop-out, e.g., to accompany a spouse to a new location, family responsibilities care of children and pregnancy would result in having less time to study and reduces the chances of female to complete on time (Sondlo, 2014).

The literature reveals that the relationship between age and learning is varied. Some theories support life-long learning as illustrated by Merriam (2001) who suggested that learning takes place throughout one's lifetime. Conversely, other theories confirm that there is an inverse relationship between ageing and learning. For example, Martin, Maclachlan & Karmel (2001) showed that postgraduate students under the age of 25 years registered higher completion rates in a cohort of postgraduate students in Australian universities between 1992 and 1999.

The South African Department of Higher Education Monitor Number 9 figures showed race comparisons, with race being statistically significantly associated with graduation and on-time graduation. White students perform better statistically than their black counterparts on variables ranging from the average number of years to graduate to the percentage that graduates (Center for Higher Education, 2010). Similarly, Letseka and Malle (2008) reported that the higher education graduation rate in SA for white students is more than double that of black students; 85% of black students did not graduate on-time. This is likely due to the historical socio-economic and political disparities associated with the separatist regime of apartheid.

1.3.4 Cumulative effects of delays in completion

There is a cumulative effect of delays in students completing their degrees. The delays result in a higher number of renewed enrolments of students as a percentage of total enrolments, which means that more students remain or 'pile up' in the system, and the system is producing fewer graduates relative to the number of recurring students (Higher Education monitor no. 7, 2009).

In SA pile-up effect is prevalent among both male and female students and is higher among African and Coloured students at the Masters level. The percentage of women who renewed enrolment increased from 34% in 2000 to 43% in 2005, and the percentage of men from 37% in 2000 to 43% in 2005. Pile-up across all race groups increased, most notably in the Black African (35% in 2000 and 48% in 2005) and Coloured groups (26% in 2000 and 31% in 2005) (Strydom, Mentz, and Kuh, 2010).

1.3.5 Mode of registration

The mode of registration has been found to be associated with time to graduation. Some postgraduate programmes encourage a work study interface which allows students to combine work and study simultaneously. The negative impact of combining work and learning leads to poorer adjustment to university life in terms of academic performance, or drop out, social inclusion and psychological well-being, it might lead to physical or mental collapse caused by overwork (Wingfield 2011).

Few studies have examined the association between mode of registration and on-time completion and throughput, Seagram and colleagues (1998) found a significant association between FT enrolment and on-time completion of a Master's degree in the University of the Western Cape, where FT students were more likely to graduate on time. Similarly, Martin, et al. (2001) found that in the Australian Higher Education system, FT students had a higher completion rate than their PT counterparts.

In Organization for Economic Co-operation and Development (OECD) countries, the percentage of PT students increased from 19.8 % in 2005 to 22% in 2011, (OECD Report, 2011), In this study the percentage of South African students registered for MPH as PT for the period 2000- 2008 was 76%.

1.3.6 Supervision

Supervision is another factor that determines students' on-time graduation. A large number of studies have found that, inadequate supervision for postgraduate research is the primary reason for postgraduate students' not completing their studies on-time (Fraser &

Mathews, 1999; Lessing & Schultze, 2002; Mouton, 2007). Adequate supervision can be assessed in many ways. For example, Mouton's (2007) supervision model identified the main roles and responsibilities of supervisors towards students to be (1) advisory role (2) guidance role (3) quality control role (4) pastoral role (to provide emotional and psychological support), and (5) administrative role. Within the context of the University of the Witwatersrand, postgraduate regulations require that a supervisor should be assigned to every student who undertakes research or dissertations in all Faculties and Schools (Wits - Faculty of Health Sciences, 2010).

High quality supervision assists postgraduate students to fulfill their research standards on-time, which, in turn, enhances the institution's research reputation. In a beneficent cycle, high calibre students are attracted by a supervisor's reputation for excellent supervision and their strong research profile. A study by Botha (2010) found that skilled and motivated supervisors provide high quality student performance. Supervisors also have a positive role to play in ensuring on-time completion. Botha investigated the effect of quality of supervision on completion rate, and timely completion of the PhD degree. He found that, it was associated with completion rate. A study carried out in Australia in 1994 identified that a good supervisor is characterised as being supportive, having a positive attitude, and conveys enthusiasm for research (Heath, 2002).

Furthermore, Whitelock, Faulkner, and Miell, (2010) suggest that the role of a supervisor is analogous to that of a business manager and models supervision using an integrated version of Quinn's Competing Values Framework (CVF) of managerial roles. The model identified eight operational roles (innovator, broker, producer, director, coordinator, monitor, facilitator, *and mentor*). However, the student will not graduate on-time unless a supervisor is available and accessible, even if these roles are fulfilled (Whitelock, Faulkner, and Miell, 2010)

The ASSAf (2010) identified four main supervision-related reasons for "pile-up" effect:

- Availability of supervisors to students (time, access and communication), e.g. if supervisor is overburdened with lecturing load/ other students,
- Supervisor takes an extended period to provide students with feedback

- Students only have access to one supervisor
- Supervisor supervises many students, where there is not enough time for the students.

Similarly, Cassim (2014) outlined the association between the availability of supervisors and on-time graduation. He argued that delays in on-time completion are associated with supervisors who do not give any feedback, do not give timeous feedback, are away for extended periods of time, or are too busy.

In the same way, Manathunga (2005) and Lessing & Schultze (2002) explored the role of experienced supervisors in detecting early warning signs and the impact on postgraduate study completion rates. Both studies revealed that the problems associated with the delay of postgraduate research relate to the research design, the collection and processing of information and the writing of the research report. Furthermore, the research studies revealed that these problems are often caused by institutional factors, supervisory arrangements and student personal factors.

The number of supervisors who supervise a student may affect the student's time to graduate. A study by Robertson (2014) revealed that having more than one supervisor may be a good idea. the importance of team supervision is it have significant impact on the student and optimizing student's outcomes; however, it can be a tremendous disadvantage to the student, the power dynamics or the degree of asymmetry of power relations within the team, hidden and largely unconscious mesh of desires that operate between the personal and professional positions of participants would create a fertile ground for confusing and conflicting advice and diffusion of responsibility or the playing of one supervisor off against another, thus team supervision could have negative effect on the student to complete within prescribed time limits (Robertson, 2014).

A supervisor's workload may affect the student's personal schedule, and student may find her/himself need to wait or make changes even if it's hard for her/him to suit the supervisors schedule, Cassim (2014) argued that there are factors that may limit a student's ability to complain or express him/herself to their supervisors due to imbalance of

power. For example, differences in race, culture, gender, gender identity, sexual orientation, religion, urban/rural, nationality, language and educational background may impact time to graduation. Furthermore, disagreements between the supervisor and co-supervisor or between the co-supervisor and other academics may also result in the student not graduating on-time.

Factors related to primary or co-supervision, full-time or honorary staff supervision, formal training for novice supervisors and the standardisation of supervision quality plays a vital role in the outcome of throughput rates.

The success rate of postgraduate students may be affected by poorly coordinated teaching and academic development; workload-distribution combined with low remuneration, and demotivated academic staff (Frouws, 2007).

1.3.7 Information system and monitoring students' progress

Reliable data enable authorities to evaluate the institute, progress of students and accordingly authorities set plans and making decisions to improve performance and throughput rate (Strimbel, 2016). Accurate data about the students' progress enables decision-making authorities to set smart objectives and realistic planning, which contributes to the overall improvement of the institution's performance.

The improvement of throughput rates requires an efficient tracking system that monitors student progress, especially during the research component. Effective monitoring and evaluation needs an efficient and viable information system. Should the current information system remain in place, there is likelihood that the school will miss an opportunity to solve students' problems earlier and indirectly causes delays in study completion (Hasnan and Hamid, 2015).

The quality of data is influenced by the process of data flow in an institution and its influence on the quality of information obtained from such data at a later stage (Correia, et. al.,2009). A study by Maydanchik (2007) revealed that manual data entry is problematic due to typing errors and incorrect data entries. Furthermore, data cleaning rules may in some cases create more data problems (Maydanchik, 2007).

Conversely, high quality data enables management to obtain reports that assist in adopting strategies for continuous improvement of throughput rates. High quality data enables authorities to maintain accurate and easily-retrievable record of progress for each postgraduate student (Komka & Daunoravicius, 2015).

Poor data quality on students' progress, from registration to graduation, often undermines throughput rates, the on-time completion rate, and all other performance indicators. The strategies for throughput improvement and on-time graduation depend on reliable statistics and accurate annual records through a system that is capable of tracing the progress of each student up to completion stage (Amehoe, 2013).

The tracking of students' progress enables the authorities to regularly collect data and to double check the data quality. Tracking students' progress helps to improve their performance and early detection of and management of difficulties that delay or impede student to complete with the timeframe. Hasnan, Aziz & Hamid, (2015) explained the importance of having mechanisms to track the progress of postgraduate students and the effect the absence of such systems on study completion. The authors argued that postgraduate students require different resources and support at different phases of their graduate study; even at the highest level of education, students still need to be monitored. A university in Uganda dismissed 69 out of 295 students due to poor performance and the lack of progress since starting the programme (Hasnan, Aziz & Hamid, 2015), it would be possible that appropriate intervention was not applied to improve students' performance. Tinto (2004) recommended the implementation of an external mechanism to monitor postgraduate students' progress and performance which may help guide their studies

Therefore, a tracking system is an effective tool for monitoring the student's progress and could reduce the time taken to graduate. Tracking gives the administrators of postgraduate department's feedback on the progress of students. The early indicators on student performance can measure the need for counseling if the progress is behind schedule. A study by Ismail (2011) revealed that students need to be supported and guided by the academic institution in order to keep them on track to complete their study on-time. As a

result, administrators put support systems in place to observe the progress of postgraduate students which motivates students to complete their research on- time.

The importance of institutions having good information systems and appropriate interpretation of information as a means of identifying where retention is, and helps to monitor the impact of interventions designed to improve retention. Therefore, monitoring helps to improve performance and achieving results as well as improve the current and future management of outputs. Monitoring students' progress and outputs provides a useful base for evaluation. It helps to measure their performance towards their academic goals, identify problems early on so that the School can adjust the student's progress toward improving on-time graduation and throughput rates (Ashby, 2004)

Evaluating and monitoring the performance of students' enables:

- The administrative authorities to know how well the system is working,
- Identify areas of weaknesses in the different departments and units, and
- Track time bound performance to avoid unnecessary delays.

To this end, the underlying causes that are often cited for poor completion rates include problems of a personal nature, institutional, and supervision. The quality of information that is used to measure throughput in the SPH may mask the true performance and throughput rates (Frouws 2007).

1.3.8 Problem Statement

Improving postgraduate throughput in South African universities is considered a national priority due to the increasing need for training skilled professionals in SA as a result of the gap caused by the "brain drain" (a phenomenon where large numbers of educated and skilled people leave their own country to live and work elsewhere where pay and living conditions might be better) (Council on Higher Education, 2010).

Low throughput rates and a decline in the number of students graduating on-time represents a waste of resources given, the financial, time and human resource

investments made when teaching and supervising postgraduate students. Therefore, the reasons for poor throughput rates in South African universities need to be explored.

Due to missing student information during 1998 to 1999, the period of the study was 2000 - 2008, 2010 cohort were not included because on-time graduation was expected in 2013 - 2014 for FT and PT respectively and the study was started early 2013

1.3.9 Justification for the Study

This study was motivated by a need to develop a better understanding of the factors associated with on-time graduation of MPH students in the SPH. There is a growing need to understand how a programme or institution is performing relative to its performance in the previous years.

The identification of the factors associated with on-time graduation might inform university planners and other stakeholders to implement the appropriate interventions in order to improve performance. This is important for strategic academic planning and to enable the quality assurance principles to improve on-time graduation.

However, if low throughput and low on-time graduation remains without appropriate solutions Schools, Faculties and the university will fall short of its targets. On a more tangible level, lower throughput results in a loss of financial subsidies(for performance) and, consequently, limits the School and university's ability to produce skilled professionals.

1.3.10 Aim of the Study

The overall aim of this study was to examine throughput among MPH students at the SPH at the University of the Witwatersrand for the period 2000 to 2008.

The study sought to identify MPH students' socio-demographic, mode of registration and supervision-related factors that were associated with on-time graduation. In addition, the study aimed to describe the quality of information that is used to measure throughput in the SPH.

The specific objectives of this study were to:

1. Describe the socio-demographic factors: age, sex, race and nationality, mode of registration: PT or FT, supervision: the number of supervisors allocated among registered MPH students for the period 2000-2008.
2. Describe the number of students who graduated and graduated on-time for the MPH for the period 2000 to 2008.
3. Examine the association between the graduation, and the student characteristics including: socio-demographic factors: age, sex, race and nationality, mode of registration: PT or FT, and supervision-related factors: whether a supervisor is Wits staff or not and the number of supervisors allocated to a student of MPH students for the period 2000 to 2008.
4. Examine the association between the on-time graduation with respect to mode of registration (PT or FT), supervision-related factors (whether a supervisor is Wits staff or not and the number of supervisors allocated to a student), and student socio-demographic factors (age, sex, race and nationality) of MPH students for the period 2000 to 2008.
5. Describe the quality of the information system issues observed in the AISU database of MPH students for the period 2000 to 2008.

CHAPTER 2: METHODOLOGY

2.1.1 Study Design

A cross-sectional record review was conducted. Records from 2000-2008 were retrieved from the Academic Information and Systems Unit (AISU) database. A record review was appropriate as the database is the official record of academic outcomes and characteristics of MPH students.

2.1.2 Study Setting

The University of the Witwatersrand, which is located in Johannesburg, comprises of five

Faculties, Health Sciences, Humanities, Science, Engineering, the Built Environment, and Commerce Law and Management. The Faculty of Health Sciences has seven schools, namely Anatomical Science, Clinical Medicine, Oral Health Science, Pathology, Physiology, Therapeutic Science, and Public Health (WITs, 2017).

The MPH programme is one of the flagship degree/diploma programmes within the SPH. The School embraces a range of public health disciplines including: community medicine, epidemiology and biostatistics, HSP, RH and OH. The School is located in the Education Campus in Parktown suburb of Johannesburg and for the period under study was part of the Medical School (SPH, 2015).

2.1.3 Study Population

The study population included all records of all MPH students enrolled in the SPH Health at WITs for the period 2000 to 2008. Records of students, that were stored centrally at the University's Academic Information Systems Unit (AISU), formed the sampling frame for this study.

2.1.4 Sample

All MPH students enrolled at WITs, Faculty of Health Sciences for the period 2000 to 2008 were included in this study. There were 223 students for the period 2000 to 2008.

Any student who was registered as an occasional student or for non-degree purposes was excluded from the study. Students registered for a post graduate DPH were excluded, all MPH students enrolled in period 2000 -2008 were included in this study

2.1.5 Data Extraction and data source

The data for MPH students first registered between 2000 and 2008 were extracted by AISU from their database. The following data were extracted: year of first registration, socio-demographic characteristics, mode of registration: FT or PT and supervisor-related factors: number of supervisors and whether the supervisors were Wits staff and graduation

status for MPH students in the sample. The data extraction sheet is in Appendix A.

2.1.6 Measurement

Outcome variables: There were two outcome variables, whether a student graduated or not and whether the student graduated on-time.

- Graduation: AISU provided data on graduation (yes/no)
- On-time graduation: On-time graduation was calculated by subtracting the year of first registration from the year of graduation. This was then recoded as on-time or not depending on whether the student was FT (expected graduation in three years) or PT (expected graduation in five years). If the time exceeded the amount of time that was expected the student was coded as not having graduated on-time.

Explanatory variables: Variables included age (which was recoded into age groups), nationality (which was recoded into South African / non-South African), sex (male/female), mode of registration (FT/PT) and supervision (number of supervisors).

2.1.7 Data Processing and Analysis

The original data which were captured in Microsoft Excel imported into STATA-13. Thereafter, the data was coded, cleaned, and analysed. The data were checked for missing items, and for any contradictions. For example, a student could not have a date of first registration that proceeded the study period. Simple descriptive statistics were carried out in order to become familiar with the dataset and detect missing and inconsistent values.

Frequencies and proportions were used to describe the socio-demographic characteristics, mode of registration and supervision-related factors. In addition, means were used to summarise continuous variables such as age. Summary statistics are reported using tables.

Univariate analyses were conducted to describe the association between the independent (socio-demographic, mode of registration and supervision-related factors) and dependent

variables (graduation, and on-time graduation). A p-value of less than 0.10 was considered statistically significant. A significance level of 0.05 of more typical but the sample size was too small to detect moderate to small differences between those who graduated and those who did not. Associations between socio demographic characteristics, mode of registration and supervision related factors with both graduation and on-time graduation were calculated using chi-squared tests. Pearson's chi-squared test is applied to categorical data to evaluate how likely it is that any observed difference in proportions compare to expected differences between them. Fisher's exact test was used in the analysis of where there were fewer than 10 observations in a cell.

For the analysis of the quality of AISU records, observations were made about what data were available and the quality of the data. The observations allowed for a description the quality of the information system, description the tracking and monitoring systems in the AISU, and their efficiency in assessing and following MPH students' progress.

Table 2.1: Data analysis plan by study objective

Objective	Variables	Data analysis
Describe the socio-demographic factors: age, sex, race and nationality; mode of registration: PT or FT; supervision: the number of supervisors allocated among registered MPH students for the period 2000-2008.	Age (continuous) Age group (categorical) Sex (categorical) Nationality (categorical) Mode of registration (categorical) Supervision (categorical)	Frequency and proportions; mean and standard deviation for age Presented in a table
Describe the number of students who graduated and graduated on-time for the MPH for the period 2000 to	Graduated (categorical) Graduated on-time (categorical)	Frequency and proportion

2008		
Examine the association between the graduation, and the student characteristics of MPH students for the period 2000 to 2008	Outcome: graduation Explanatory variables (age group, sex, nationality, mode of registration, supervisors)	Chi squared tests
Examine the association between the on-time graduation, and the MPH student characteristics for the period 2000 to 2008	Outcome: graduation Explanatory variables (age group, sex, nationality, mode of registration, supervisors)	Chi squared tests and Fishers Exact test

2.2 Ethical Considerations

Ethical approval to conduct the study was obtained from the Human Research Ethics Committee (HREC M120816, dated 31/8/2012) (See Appendix C). Permission was obtained in writing from the AISU Unit for usage in this study (See Appendix B).

Confidentiality and anonymity of the research participants was upheld. Anonymised data were used; however, student numbers were used to link the data. In this case, all identifying information was coded with a unique identifier and links were kept separately. The data were stored in a password protected computer during the analysis period. The results are reported as group results in order to protect any potential identifying information to the SPH and AISU.

CHAPTER 3: RESULTS

3.1 Introduction

This chapter presents the socio-demographic characteristics of the students (age, sex, nationality and race), mode of registration (whether the student is registered PT or FT) and supervision-related factors (whether the supervisor is Wits staff member or not, number of supervisors allocated to a student), the graduation status of students first registered between 2000 and 2008, using frequencies and proportions. The results of the univariate analyses are presented, as well as results that relate to challenges with record-keeping.

3.2 Socio-demographic characteristics, mode of registration and supervisor-related factors of the MPH students

Table 3.1 Socio-demographic characteristics, mode of registration and supervisors of students registered between 2000 and 2008 (n=223)

Characteristic	Number of students	Percentage
Race	N	%
Black	154	69.1
White	44	19.7
Indian	15	6.7
Coloured	10	4.5
Age		
Less 30	65	29.2
30 – 39	98	43.9
40+	60	26.9
Nationality		
South African	159	71.3
Non South African	64	28.7
Sex		

Male	112	50.2
Female	111	49.8
Mode of registration		
PT	159	71.3
FT	64	28.7
Supervisor n = 204		
Wits Staff member	137	67.2
Non Wits staff member	67	32.8
Number of supervisors (n=176)		
1	108	61.4
2+	68	38.6

The records received from AISU indicated that there were 223 students registered for the MPH during the period under study. The socio-demographic characteristics, mode of registration and supervisor related factors of MPH students (n = 223) are shown in **Table 3.1**. In terms of race, Black Africans¹ comprised the highest proportion of the sample (69.1%) followed by White (19.7%), Indian (6.7%) and Coloured (4.5%) students. Approximately seventy-one per cent of the sample was South African.

The mean age of the MPH students was 35 years, with a range between 19 and 59 years. Twenty-nine per cent of the students were under the age of 30 years, 43% of the students were between 30 – 39 years, and 27% of the students were older than 40 years. The distribution of sex in the sample was 50.2 % for males and 49.8% for females; there were 111 female students and 112 male students.

¹The terms “White, Black, Indian/Asian, and Coloured” originate from the *apartheid* era. They refer to demographic markers and do not signify inherent characteristics. Their continued use in South Africa is retained to track transformation and to identify vulnerable sections of the population to be targeted for prevention and intervention programmes.

In terms of mode of registration 71.3% of the students were registered as PT students, whereas only 28.7% were registered as FT students. Two-thirds (67.2%) of the supervisors were WITs staff members and 32.8% of the supervisors were non-WITs staff. There were 61.4% of the students were supervised by one supervisor and 38.6% of the students were supervised by more than one supervisor.

3.3 Academic outcomes of MPH students registered 2000-2008

Table 3.2 Academic outcome of students registered in MPH programme, 2000 – 2008

Graduated				Did not graduate		Total
On-time		Not on-time				
N	%	N	%	N	%	N
121	84.0	23	16.0	79	35.4	223

The academic outcome of the students is shown in table 3.2; nearly two thirds of all students (64.6%) graduated while 35.4% did not, and of those 84% graduated on-time while 16% of those who graduated did not graduate on time.

3.4 Factors associated with graduation

Table 3.3 shows the Socio-demographic characteristics MPH students 2000-2008, mode of registration and supervisors related factors by graduation status

Race (n=223)	Not graduated (%)	Graduated (%)	P- Value
Black	62 (40)	92 (60)	0.10
White	12 (27)	32 (73)	
Indian	2 (13)	13 (87)	
Coloured	3 (30)	7 (70)	
Sex (n=223)			
Male	40 (35)	72 (65)	0.93
Female	39 (35)	72 (65)	
Nationality (n=223)			

South African	64 (40)	95 (60)	0.08
Non South African	15 (23)	49 (77)	
Age (n=223)			
<30	24(37)	41(63)	0.18
30-39	35(36)	63(64)	
40+	20(33)	40(67)	
Mode of registration (n=223)			
PT	60(38)	99 (62)	0.15
FT	19 (30)	45 (70)	
Nature of supervision (n=204)			
Wits Staff member	52 (38)	85 (62)	0.26
Non Wits Staff member	29 (43)	38 (57)	
Number of supervisors(n=176)			
1	31(29)	77 (71)	0.75
2+	18 (27)	50 (73)	

The socio-demographic and supervision characteristics by graduation is shown in table 3.3. The results indicate that there were no statistically significant differences in graduation by race; 60% of Black, 73% of White, 87% of Indian, and 70% of Coloured students graduated. In terms of sex difference, there was no statistically significant difference between graduation rates for males and females.

Non-South African students were more likely to graduate (77% vs. 23%) when compared to South African students (60% vs. 40%). This difference was statistically significantly different at the 0.10 level ($p=0.08$). There was no statistically significant difference in graduation by age group; 63% of the students below the age of 30 years graduated; compared to 64% in the 30 and 39 age group between and 67% age group 40 and older.

In terms of the mode of registration, 62% of the students who registered on a PT basis graduated while 38% of them did not graduate, and among full time students 70% of them were graduated while 30% of them did not graduate. There were no statistically significant differences.

Almost two thirds of the students who were supervised by full time Wits staff members graduated (62%), compared to those supervised by non-Wits staff members only 57% of them graduated. However, this difference was not statistically significant. Seventy-one percent of the students supervised by one supervisor graduated, compared to 73% supervised by two or more supervisors. There is no rule for the number of supervisors allocated to a student.

3.5 Factors associated with on-time graduation

Table 3.4 Association between MPH student's socio-demographic factors, mode of registration and supervisors related factors and (graduation/on-time graduation), 2000-2008

Race n= 144	Graduated (on-time)(%)	Not graduated (on-time)(%)	P value
Black	78 (85)	14 (15)	0.79
White	27(84)	5 (16)	
Indian	11 (85)	2 (15)	
Coloured	5 (71)	2 (29)	
Total	121(84)	23 (16)	
Nationality (n=143)			
South African	41(44)	53 (56)	0.32
Non South African	37 (76)	12 (24)	
Total	78 (54)	65 (45)	
Sex (n=144)			
Female	59 (82)	13 (18)	0.65
Male	62 (86)	10 (14)	

Total	121 (84)	23 (16)	
Age n=143			
<30	24(59)	17(41)	0.46
30-39	33(53)	29(47)	
40+	21(53)	19(47)	
Total	78(55)	65(45)	
Mode of registration (n=144)			
PT	80 (81)	19 (19)	0.37
FT	41 (91)	4 (9)	
Total	122 (85)	23 (15)	
Number of supervisors (n=126)			
One Supervisor	42 (62)	34 (58)	0.72
Two or more Supervisors	26 (38)	24 (41)	
Total	68 (54)	58 (46)	
Supervisor n =123			
Wits Staff	63 (84)	22 (16)	0.60
Non Wits staff	24 (79)	14 (21)	
Total	87	36	

Table 3.4 shows a sub-analysis of the association between the characteristics of MPH students and on-time graduation. A total of 85% of Black students 84% White, 85%, Indian, 71% Coloured students graduated on-time. There were no significant differences between race and graduation and on-time graduation (Fisher's exact test $p = 0.79$).

Nationality was not significantly associated with on-time graduation ($p=0.32$), 44% of the South African students were graduated on-time while 56% of the graduated students did not graduated on-time, this is in comparison with non-South African students where 76% of the graduated students were graduated on-time and only 24% of graduated students did not graduated on-time.

Sex was not significantly associated with on-time graduation ($p= 0.65$), 82% of graduated female students were graduated on-time, compared with the graduated male students where 86% of male students were graduated on-time, and only 18% of graduated female students were not graduated on-time, while 14% of graduated male students did not graduate on-time.

Age was not significantly associated with on-time graduation ($p = 0.46$). More than half (59%) of graduated students with the age less than thirty were graduated on-time, while 41% from the graduates in this age group did not graduated in-time, for the age groups 30-39 and 40+ the percentage of students graduated on-time were 53% for both age group from the graduated students in the group, while those who did not graduated on-time for both age group were 47%

Mode of registration was not significantly associated with on-time graduation ($p= 0.37$). For the students registered PT 81% of them graduated on-time from all PT graduates, while those who did not graduated on-time were 19%, this is in comparison with the FT students where 91% of them were graduated on-time from all FT graduates, only 9% of FT time students did not graduate on-time

The number of supervisors allocated to a student was not associated with on-time graduation ($p= 0.72$). Only 55% students supervised by one supervisor were graduated on-time from all graduates supervised by one supervisor, while 45% of students supervised by one supervisor were not graduated on-time from all graduates supervised by one supervisor. 52% of the students supervised by more than one supervisor were graduated on-time from all graduates supervised by more than one supervisor, and 48% of the students did not graduate on-time.

There were no statistically significant differences between students who were supervised by staff from WITs versus those supervised by non-Wits staff and on-time graduation ($p = 0.60$), 84% of the students supervised by WITs staff graduated on-time, while 16% did not graduate on-time, in students supervised by non-WITs staff, 79% graduated on-time and 21% did not graduate on-time.

3.6 Quality of data and information systems

During the course of undertaking this research, information systems emerged as a challenge during the data collection. A closer examination of the AISU records of the MPH students raised concerns over the quality and reliability of the data and reported throughput rates. This led to further questions about the quality of the information system.

Quality issues were observed in the AISU database of MPH students for the period 2000 to 2008. There were no records of the exact number of new MPH students enrolled every year. Most of the data for MPH students enrolled in 1998 and 1999 were missing which is why the analysis was conducted for the period beginning in 2000. It was very difficult to differentiate between the MPH students who upgraded from DPH to MPH over the period under study and those who were first enrolled as MPH students.

At the stage of data processing and management many issues were observed in the records of MPH students 2000–2008, the system did not capture other socio-demographic characteristics, such as marital status and employment status. The system did not capture all students' supervisors as a result there was missing data. For example, only 176 students (79%) had the number of supervisors indicated, while in 21% of the students had no supervisors allocated to them. This was the case even for students who had graduated. It is not possible for a student to have completed their research without a supervisor.

The system did not give details about a students' progress, AISU records only showed the year of registration and the year of graduation. It was not possible to determine how many years a student spent completing course work or research work, which made it difficult to

measure students' progress or to identify bottlenecks in the system where students failed to progress. Information about student progress could provide an early warning system for academic staff to put remedial action in place. AISU records did not show students who postponed their studies, which make it difficult track time-bound performance.

Some students graduated in the same year of their registration, even though it is unlikely that the degree can be completed in one year. The SPH offered these programmes over two years for FT MPH students. This suggests that there are errors in the accuracy of the data that are routinely collected in the AISU database.

CHAPTER 4: DISCUSSION

4.1 Introduction

This study aimed to describe the factors associated with graduation and on-time graduation of MPH students in the SPH at WITs from 2000 to 2008. Specifically, the research examined the associations between socio-demographic, mode of registration and supervision-related factors, and graduation and on-time graduation. Finally, the study aimed to shed light on the quality of information that is used to track throughput within WITs. The results are discussed in light of the relevant literature and within the Latona and Browne framework (See Figure 1.2).

4.2 Completion of post-graduate degrees

From the literature review in chapter one, completion of postgraduate degree is recognised to be one of the most notable challenges in the higher education institutions internationally and nationally. In spite of institution and government efforts to produce more degrees, and to improve graduation rates, the proportion of students who enroll and then graduate is still below the desired objectives (Sayed, Kruss & Badat 1998; Frouws, 2007; Amehoe, 2013; Holdaway, Deblois & Winchester, 1995; McCormack, 2005; Amehoe, 2013). In this context it is important to note that in this study over a third of students, who enrolled for a MPH at the Wits SPH, in the period under study, did not complete their degree. On-time graduation emerged as less of a concern as the vast majority who graduated did so on time. The average graduation rate of masters degree in SA for the year 2011 is only 20%. (Higher Education and training, 2011)

Frouws (2007) argued that more attention has been focused on access rather than on completion of tertiary studies(Frouws, 2007). Appropriate interventions; tracking students' progress, monitoring and evaluation of students' progress with research and analysis of the factors that might cause delays in completion would help to inform policy and decision-making at the different levels of the system to increase the number of postgraduate students who graduate (ASSAf, 2010).

4.3 Factors related to completion of studies

According to the literature factors related to completion of postgraduate studies are many ranges from: academic factors, supervision factors, student's factors, academic background, research writing skills and student commitment (Amehoe, 2013).

In this study, the factors: student' socio-demographic (age, sex, nationality and race), mode of registration (PT or FT) and supervisor's related factors (number of supervisors allocated and Wits vs. non Wits), were only examined.

4.4 Socio-demographic characteristics associated with completion of studies

In this study we did not find differences in the socio-demographic characteristics of students who graduated or who graduated on time. The only factor that neared statistical significance was being a non-South African.

The findings of this study showed no significant association between sex and on-time graduation, internationally there is a variation in the number of men and women who graduate, in (OECD) countries, more women are anticipated to obtain degree than men based on 2013 graduation rates, similar to Iceland, Poland, the Slovak Republic and Slovenia (Vincent-Lancrin, 2008), and New Zealand women were more likely to complete the degree than men (Scott, 2005). In Germany, Mexico and Switzerland, graduation rates between the sexes are balanced. In contrast, Japan and Turkey, more men graduate from university-level education. In contrast, Martin, Maclachlan and Karmel (2001) argued that in Australia female students were equally or even more likely to complete their studies than males. In SA Price (2006) found that female students required more time than male students to complete their studies. Strydom, Mentz, & Kuh, (2010) revealed pile-up effect is prevalent among both male and female students and is higher among African and Coloured students at the Masters level. Female students can get pregnant during their studies, which could be a reason for delays, and student will not be able to complete her studies on-time, another reason for not completing on-time is employment status, when student is overloaded with job obligations and working for long hours.

In this study 75% of South African students were registered as PT, with the mean age of MPH students in this sample was 35, in spite of the missing data on employment status, it is obviously that they have responsibilities either family or work or both. Many studies have explained the difficulties when combining learning and earning. Students from lower income groups and families find it difficult to manage their budget between families needs and the university wants..

The findings around age and rate of on-time completion vary, with some studies showed no relation between age and completion of studies, suggesting that learning takes place throughout one's lifetime (Merriam, 2001). In contrast, it could be argued that there is an inverse relationship between ageing and learning, with younger students performing better. In a study of Australian universities between 1992 and 1999, Martin, Maclachlan and Karmel (2001) demonstrated that younger postgraduate students registered higher completion rates. One may assume students' age less than 25 years have less work responsibilities..

Despite the fact that this study did not find an association between race and graduation, there is a body of literature that shows a relationship. Letseka and Malle (2008) reported that the higher education graduation rate in SA for White students is more than double that of Black students due to socioeconomic reasons (Malle, 2008). Another reason for the differences in graduation rates between White and Black students was the unequal access to quality education (Letseka and Malle, 2008). Pile-up across all race groups increased, most notably in the Black African and Coloured groups (Strydom, Mentz, and Kuh, 2010).The South African Department of Higher Education Monitor Number 9 figures showed race comparisons, with race being statistically significantly associated with graduation and on-time graduation. White students perform better statistically than their black counterparts (Center for Higher Education, 2010).

4.5 Mode of registration

In this study, there was no statistically significant difference in graduation between PT and FT students. Seagram and colleagues (1998) found a significant association between FT enrolment and on-time completion of a Master's degree in the University of the Western

Cape, where FT students were more likely to graduate on time. Similarly, in the Australian Higher Education system, FT students had a higher completion rate than their PT counterparts (Martin, et al. 2001). FT students are more likely to graduate on-time compared to PT, the explanation for this variation is that students who combine work are less likely to have enough time to study and complete on-time, with the difficulties to cope with their academic, family commitment, and work commitment, the other reason for the decrease number of students completed on-time in the findings of this study is that the majority of students in this study were enrolled as PT students and the majority were South African students.

4.6 Supervision

Factors related to primary or co-supervision, FT or honorary staff supervision, formal training for novice supervisors and the standardisation of supervision quality could play a vital role in the outcome of throughput rates. In this study results showed there was no association between Wits supervision vs. non-Wits supervisors or the number of supervisors and graduation/on-time graduation. However the variables to assess supervision were very limited. We could only look at the number of supervisors and whether the supervisor was a Wits or non-Wits staff member. We were not able to assess the quality of the supervision received. There may be critical factors such as the availability of supervisors to students (time, access and communication) which could have influenced whether students graduated, e.g. if a supervisor is overburdened with lecturing load/ other students, or supervisor takes an extended period to provide students with feedback.

The quality of supervision may play an important role in determining the outcome of students. In a study by Botha (2010) skilled and motivated supervisors were found to provide high quality student performance. Another study carried out in Australia by Cullen et al.(1994) identified that good supervision conveys enthusiasm for research. Other studies showed that workload affects supervisors' performance, and the quality of supervision, inadequate supervision for postgraduate research is the primary reason for postgraduate students' not completing their studies on-time (Botha, 2010; Fraser & Mathews, 1999; Lessing & Schultze, 2002; Mouton, 2007).In the same way, Manathunga

(2005) and Lessing & Schultze (2002) explored the role of experienced supervisors in detecting early warning signs and the impact on postgraduate study completion rates.

Frouws (2007) explained that the effect of high workload combined with low remuneration demotivated academic staff and negatively affected the success rate of postgraduate students.

4.7 Information Systems and Monitoring Student Progress

This study reviewed the factors associated with on-time graduation from 2000 to 2008 (a nine year period). Although many of the emerging challenges and issues still persist, the study findings cannot be considered as representative of the current state of throughput rates for MPH students. Certain interventions may have been in place during the period of study, which may have influenced on-time graduation.

The study did not examine the performance AISU, i.e., methods of data collection, processing and analysis but many issues were observed that undermined the quality of data the presented records, there was no explanation to the missing data was observed in the records, although studies showed that manual data entry might be responsible for missing data, Maydanchik (2007) revealed that manual data entry is problematic due to typing errors and incorrect data entries (Maydanchik, 2007).

There is no clear explanation for the non-logical findings in the records e.g. students registered and graduated in the same year. Cruz-Correia, (2009) explained the quality of data is influenced by the process of data flow in an institution and its influence on the quality of information obtained from such data at a later stage.

The importance of tracking student's progress not only in improving throughput rate but also in checking of the quality of data collected. Hasnan, Aziz & Hamid, (2015) revealed that the tracking of students' progress enables the authorities to regularly collect data and to double check the data quality, it not clear how the AISU evaluate and monitor the process of data collection and management, evaluating and monitoring the performance of students' enables the administrative authorities to know how well the system is working, Identify areas of weaknesses in the different departments and units, and (Hasnan, Aziz &

Hamid, 2015)

4.8 Limitations

When considering the findings of this study, it is important to note the following limitations:

- The researcher was not in control of the data quality as this study was a record review of data that is routinely captured by Faculty.
- The external validity of the results is limited as the study was conducted at only one higher education institution and looked at only one programme offered within the Health Sciences Faculty. WITs does not represent other South African universities since each university has a unique student population and staff compliment.
- Several potential confounding factors could not be explored in this study such as employment status, financial status, marital status, and supervisors' workload as the data were not routinely captured.
- The small sample size may have resulted in insufficient power in the study to detect differences between those who graduated and those who did not.
- Misclassification of FT and PT students may have occurred. The Department of Home Affairs only allows for international students to study FT. This would mean that all international students were registered on the system as FT but it is possible that in reality some were studying PT.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

In conclusion, only two-thirds of all students who enrolled for a MPH graduated, indicating that there is room for improving the throughput rate. Of those who graduated, the vast majority graduated on-time suggesting that the gap is with overall graduation rather than on-time graduation. The findings from this study showed no association between socio-demographic factors, mode of registration and supervisor related factors and both graduation and on-time graduation. The one marginal finding suggests that non-South African students may be more likely to graduate compared to their South African counterparts. The findings were not consistent with national throughput rates, which may be attributed to the quality of the information system and the quality-related issues of the AISU records. The data that is routinely captured by the university is very limited, there were no data available in other socio-demographic factors, marital status, employment status, number of students who postponed their studies, upgraded from DPH to MPH, whether they fail course work or not, details about non Wits supervisors, recruitment, remuneration and motivation and how they assess their performance.

5.1 Recommendations

Evidence from available national and international literature suggests that the research components remain the bottleneck to graduation. The need to examine students' satisfaction with supervision to facilitate effective supervision, and common understanding between the supervisors and the students about the nature and cause of the students' difficulties present some opportunities that could positively impact on-time graduation,

Due to missing student information during 1998 to 1999, unrecognized data in the sample can have a negative influence on the results. These shortfalls point to the need for a comprehensive improvement of the information system.

There is a strong need to implement an efficient tracking system to observe the progress of students towards completing their study and monitor the overall progress towards on-time graduation.

tracking of students' progress remain an open door to early detection of and management of difficulties that delay or impede student to complete with the timeframe

It is recommended that such a tracking system feeds from the AISU level through to the Faculty and the school levels, for a comprehensive picture of student information.

There is a strong need for further research on low throughput rates or delayed completion rate, in different Schools in the faculty of Health Sciences. Latona Framework provides a good model that could be used to further develop investigation into the factors that are associated with on-time graduation.

It is plausible that other factors such as marital and employment status may result in students taking longer to complete their studies due to their family responsibilities and work-related issues. This remains an issue for further research

Finally, a follow-up study that is able to track students prospectively rather than retrospectively may be better placed, to generate up-to-date, better quality data for monitoring and tracking purposes.

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APPENDIXES

Appendix A: Data extraction sheet

Socio-demographic factors
o Age
o Gender
o Race
o Nationality
Academic factors
o Date first registered MPH
o Graduate (Graduate, Non-graduate)
o Mode of registration (Part-time/ Full-time)
Supervisionrelated factors
o No of supervisors
o Nature of supervisor employment (Wits, Non-Wits)
The dependent variables will be:
<input type="checkbox"/> Graduated on-time (yes, no)
<input type="checkbox"/> Did not graduate on-time/late graduation (yes, no)

Appendix B Permission from AISU to use the data



Deputy Registrar: Academic
P.O. Box 3, St. Michael, Barbados - Tel: +1 869 437 2911 - Fax: +1 869 437 3038 - Email: academic@uwist.edu.bb

F-mail: nls.lawton-milars@uwist.edu.bb
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Tel: +1 27 (8) 11 717-1204


10 August 2012

TO WHOM IT MAY CONCERN

"Factors associated with on-time graduation of MPH students"

It is hereby confirmed that permission has been officially granted to use the data provided by the Academic Information and Systems Unit.

Students conducting surveys must seek permission in advance from Heads of Schools or Individual academics concerned should surveys be conducted during teaching time.


Nils Lawton-Milars
Deputy Registrar: Academic

Appendix B Permission — expand hMc

Appendix C Ethics clearance



UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R1449 Dr Mohamed AA Etonesi

<u>CLEARANCE CERTIFICATE</u>	M120816
<u>PROJECT</u>	Factors Associated with On-Time Graduation of Master of Public Health (MPH) Students, at the University of the Witwatersrand 1998-2008
<u>INVESTIGATORS</u>	Dr Mohamed AA Etonesi
<u>DEPARTMENT</u>	School of Public Health
<u>DATE CONSIDERED</u>	31-08-2012
<u>DECISION OF THE COMMITTEE</u>	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 31/08/2012

CHAIRPERSON 
(Professor PE Cleon-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor: Ms L Ramsoojar

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.

I/We fully understand the conditions under which I am/we are authorized to carry out the abovesetioned research and I/we guarantee to ensure compliance with these conditions. Should any departure in be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee **I/wee to a completion of a yearly progress report**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.