APPROPRIATENESS OF THE UNAM BACHELOR OF PHARMACY HONOURS DEGREE CURRICULUM AND ITS IMPLEMENTATION, TO MEET THE PERCEIVED HEALTH NEEDS OF NAMIBIA

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Abstract

Since Independence in 1990 Namibia has struggled with a chronic shortage of pharmacists. To address this, a Bachelor of Pharmacy honours degree (BPharm) was developed and the first intake of BPharm students at UNAM was in 2011. This study is the first formal assessment of the appropriateness of the curriculum to the health needs of Namibia. A cross-sectional survey was shared with all registered pharmacists in Namibia, requesting them to rate the appropriateness of the BPharm modules to their field of pharmacy practice. Additionally, respondents rated the competence of UNAM BPharm graduates, if they had worked with them and made further comments on the appropriateness of the current curriculum. Internship assessment marks for 2016-2019 were also analysed. The survey was completed by 210 of 610 pharmacists registered in Namibia (34%). The mean appropriateness rating for 37 different modules ranged from 3.7 to 4.7 (scale: 1- not appropriate at all to 5-very appropriate). The mean rating of graduates' perceived competence for the different domains ranged from 2.8 to 3.7 (scale: 1-not competent at all to 5-highly competent). Respondents' comments suggested several enhancements to the current curriculum, with the most frequent suggestions being to strengthen business, management and leadership training. In relation to professional examinations, interns trained at UNAM performed better on the Legal assessment compared to interns trained elsewhere, but there was no significant difference between the two groups for the Calculation or Observed Structured Clinical Examination (OSCE) assessments. Results suggest that the current BPharm curriculum is appropriate for Namibia's health needs, though more emphasis needs to be placed on some key areas. It is recommended that the results of this study guide the UNAM BPharm curriculum transformation. This study also demonstrates a cost-effective method for critical assessment of health professions training curricula that can be utilised in resource-limited settings.

Key Words: Pharmacy, Curriculum, Health Needs, Competence, Namibia

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List of Abbreviations and Acronyms

BPharm	Bachelor of Pharmacy Honours Degree
CBE	Competency-based Education
COVID-19	Corona Virus Disease 2019
CPD	Continuing Professional Development
df	degrees of freedom
FIP	International Pharmacy Federation
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome
HPCNA	Health Professions Councils of Namibia
IQR	Interquartile Range
N	number
OSCE	Observed Structured Clinical Examination
p	probability
SD	Standard Deviation
t stat	t statistic
UNAM	University of Namibia
USAID	United States Agency for International Development
WHO	World Health Organisation

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Declarations

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CHAPTER 1. INTRODUCTION

1.1. Background

The 2006 World Health Report – Working Together for Health (1) highlighted the health workforce crisis being experienced around the world, but especially in low and middle income countries. Namibia was one of the countries severely affected by a shortage of well-trained health workers. Since Independence in 1990, Namibia has struggled with both chronic shortages and inequitable distribution of health professionals, including pharmacists. To address this shortage, in 2009, a field assessment was conducted to explore the establishment of a pharmacy degree course at the University of Namibia (UNAM) (2). In 2010, UNAM established a Technical Working Group of key stakeholders to develop a needs and competency-based curriculum appropriate for Namibia's health setting to provide pharmacy graduates with key knowledge, skills and attitudes (3).

To develop an appropriate curriculum, the working group first mapped current and future roles of pharmacists in the local context, then developed learning outcomes for the competency framework. Stakeholder consensus-building workshops were held that led to the development of the current curriculum. The first intake of Bachelor of Pharmacy (BPharm) students was in January 2011 (3). The course has progressed smoothly, with annual intakes, resulting in 111 BPharm graduates to date and successful accreditation by the three statutory bodies (the Namibia Qualifications Authority, the Pharmacy Council of Namibia, and the National Council for Higher Education).

1.2. Statement of the Problem

With the graduation of pharmacists from the UNAM Health Sciences Faculty, there has been a reduction in the critical shortage of pharmacists in the country. However,

as highlighted by the Director General of the World Health Organisation (WHO) in 2013, “efforts to scale up health professionals’ education must not only increase the quantity of health workers, but also address issues of quality and relevance in order to address population health needs” (4).

Although anecdotal evidence and successful accreditation suggests that the UNAM BPharm curriculum is appropriate and relevant, no formal assessment of the appropriateness of the curriculum had been done before this study was conducted. In fact, very little had been done in the field of pharmacy globally (that is reported or known) with regards to determining pharmacy curricula appropriateness to local health needs. Given that pharmacy (and other health professions) education is expanding rapidly in developing countries (especially Sub-Saharan Africa), the development of a robust model that can be used to assess appropriateness of health professional training curricula to meet the health needs of the local population in resource-constrained settings, could result in significant improvements in health in such settings.

1.3. Objectives

Principal Objective: To determine the appropriateness of UNAM BPharm honours degree curriculum to meet the health needs of Namibia.

Specific Objectives:

1.3.1. To quantify the appropriateness of the pharmacy curriculum from key stakeholder perspectives.

1.3.2. To describe the level to which UNAM BPharm graduates demonstrate locally identified and internationally accepted competencies.

1.3.3. To develop a model for critical evaluation of curricula and training in resource-constrained settings.

1.4. Significance of the study

This study directly addressed the 66th World Health Assembly Resolution A66-R23 (5) which urges member states to "consider conducting comprehensive assessments of the current situation of health workforce education". Furthermore, it was conducted in response to the WHO 2013 recommendation that "Health professionals' education and training institutions should consider adapting curricula to population needs…" in the "Transforming and scaling up health professionals' education and training" guidelines (4). The findings of this study will guide the curriculum review for the UNAM BPharm programme that will be completed in 2021. This study demonstrates a cost-effective method for critical and systematic evaluation of appropriateness of health professional training that can be used to assess and strengthen health professions training in resource-constrained settings.

CHAPTER 2. LITERATURE REVIEW

This chapter reviews the available literature related to the appropriateness of undergraduate pharmacy degree training to health needs of the population served. Literature searches were performed using the snowball approach (as there was very limited literature) on Pubmed and Google Scholar search engines and the UNAM Library website, that uses WorldCat, a global catalogue of library collections (6).

The review covers literature on; Section 2.1 the need and availability of an appropriately trained pharmacy workforce, Section 2.2 the importance of health professionals' training being appropriate for the health needs of the communities to be served, Section 2.3 studies published on health professionals' curricula appropriateness and Section 2.4 the role of competency-based training in developing a health workforce that is fit for purpose. The theoretical framework that informed the design of this study is presented in Section 2.5, followed by a summary of the literature review in Section 2.6.

2.1. Need and availability of appropriately trained pharmacy workforce

Availability of an appropriately trained health workforce is essential for a country to meet its populations health needs, as highlighted by the WHO 2013 report "A universal truth: no health without a workforce" (7). The United Nations predicts that by 2030, there will be a global shortage of 18 million health workers (8). According to the WHO Global Health Report 2006, at that time Africa carried 24% of the disease burden globally, with only 3% of the world's health professionals (1). The African Regional Health Report, 2014 shows that the African Region was still far behind the global average for availability of all categories of health workers, with pharmaceutical

personnel availability at 0.9 per 10,000 population compared the global average of 4.3 per 10,000 population (9).

An analysis of the global pharmacy workforce capacity conducted in 2016 found that from 89 countries that responded, Malta had the highest density of pharmacy workforce, with over 25 pharmacists per 10,000 population and the mean was six pharmacists per 10,000 population (10). The same report also identified clear correlations between the country's economic status (Gross National Income), health expenditure per capita and the density of pharmacists. The latest data available on the WHO National Health Workforce Accounts Data Portal reveals that while 55% of countries globally have less than 3 pharmacists per 10,000 population, in WHO Africa Region this climbs to 94% of countries. Namibia, as an upper-middle income country with low population density, fares better than many other countries in Africa and latest statistics show that it has 2.4 pharmacists per 10,000 population (11). This figure is very close to the 2.5 pharmacists per 10,000 population estimation calculated by Rennie, Nangombe, *et al* in their 2018 paper, "Health workforce planning in Namibia: assessing a pilot workforce survey of pharmacists" (12). Although Namibia's availability of pharmacists is higher than the African average, it is still far below the global average and given that the small population is distributed over a very large area (825,000km^2), more pharmacists are needed to provide accessible services to the communities, than in countries with more higher population densities. As a result, the availability of pharmacists to participate in providing health services to the community is negatively affected. Pharmacists are among the most accessible health professionals due to the fact that no appointment is needed to see them and they do not charge a fee for their professional advice (13). Hence, pharmacists make a crucial contribution to

the health status of populations served, especially in countries and communities with low income (14).

2.2. Training health professionals to meet population needs

The dramatic improvements in both living conditions and knowledge in the 20th century resulted in doubling of life expectancy (15). Unfortunately, in the 21st century, while improvement of health status has continued in some populations, the progress has been far from equitable between and even within countries. Some earlier gains in life expectancy were reversed in the first decade of the 21st century, for example in sub-Saharan Africa due to the HIV/AIDS pandemic, and other poor communities are still suffering from health problems that in wealthier populations have been eradicated decades before (16). In 2010 "The Commission on education of health professionals for the 21st century" (also known as the Lancet Commission, 2010) was launched to identify changes that should be made in education of health professionals in order to equip them with knowledge and skills needed to address present and future health challenges and try to align health workforce education and training to the health systems' needs. The Commission recommended that "*all health professionals in all countries should be educated to mobilise knowledge and to engage in critical reasoning and ethical conduct so that they are competent to participate in patient and population-centred health systems as members of locally responsive and globally connected teams*" (16). This highlights an important shift from traditional training of health workers, that was based largely on the provision of knowledge, which is inappropriate in the current age, where huge volumes of information are readily accessible to the majority of the population. The Commission report also emphasised the need for context appropriate training, rather than just the number of health workers

required. This message is re-iterated in the WHO's 2016 publication, "Global strategy on human resources for health: Workforce 2030", which states that realisation of highest attainable standards of health care require the health workforce to have necessary competency to provide quality services that are socio-culturally acceptable to the population (17).

One recurring theme in literature related to the appropriateness of health professions curricula is the need for "socially accountable health professions education" or Social Accountability (18–20). Socially accountable health professional education is broadly defined as "*the obligation to direct their education, research and service of activities towards addressing the priority health concerns of the community, region and/or nation that they have a mandate to serve*" (19). Palsdottir *et al* posit that socially accountable education facilitates optimum impact to be obtained from the funds invested in health professions education (19). In their publication *"Training for impact: the socio-economic impact of a fit for purpose health workforce on communities"* Palsdottir *et al* identify six strategies for ensuring context-appropriate health professional education, including tailoring the curricula to target specific health system needs locally, involving communities served in the education process, interprofessional education to facilitate working as teams across professional boundaries and sharing of best practices (19). The literature review of socially-accountable health professional education carried out by Reeve *et al*, identified that students' learning and attitudes are positively affected by collaborative partnerships with communities, equitable selection criteria, and community-engaged placements in underserved areas (20). Furthermore, graduates of socially accountable schools were better able to meet health needs of underserved sectors of the population as well as more likely to stay in rural areas and serve disadvantaged communities than students

from more traditional schools (20). These are important findings, as they impact key problems identified in providing high quality universal health care – namely staffing in rural areas and socio-cultural acceptability of health care provided to traditionally under-served populations.

Narrowing the focus from health workers to the pharmaceutical workforce, the International Pharmacy Federation (FIP) has produced a significant number of documents (21–29) related to pharmacy workforce development, including the Global Competency Framework for Services Provided by Pharmacy Workforce (28), all of which highlight the importance of pharmacy education being tailored to a countries health needs. The first key message of the 2013 FIP Global Education Report states "*FIP advocates for the consistent use of a needs-based approach to education with an emphasis on linking pharmacy education with the health needs of populations and national priorities*"(23). Anderson *et al* explain the importance of needs-based education for global pharmacy workforce and propose the steps to be followed for optimal education systems, namely a Needs-Services-Competencies-Education Cycle (30). The highly consultative process followed to develop the UNAM BPharm curriculum, closely follows the cycle proposed by Anderson *et al*, resulting in a curriculum based on health needs of the country (3).

2.3. Health professionals training curricula appropriateness

A review of the available literature related to pharmacy curricula appropriateness to population needs revealed that, although there is a wealth of literature related to pharmacy curricula, there has been very limited no published research could be found on the appropriateness of pharmacy curricula to a given country's or population's served health needs. Therefore, the search was widened to include relevance of training

to current pharmacy practice, graduates' readiness to practice, graduates' competencies and graduates' performance on entering the workforce; four (4) relevant studies were identified. A study carried out in South Africa assessed graduates perceptions of the relevance and adequacy of their complete pharmacy curriculum to current pharmacy practice, as opposed to the health needs of the population (31). The respondents in this study reported high relevance to current pharmacy practice (72.7-100%). Another study, conducted in New Zealand, assessed pharmacist graduates' readiness to practice, both through self-assessment and preceptor assessments (32). The majority of responses received in the survey reflected that the graduates were ready to practice, with the self-assessed readiness being ranked higher than preceptor assessed readiness. This difference could be due to variance in perception of competence between preceptors and recent graduates (33). It is also likely that graduates higher self-assessment is due to the Dunning-Kruger effect, where individuals who have low competence in a field "*will dramatically overestimate their ability and performance relative to objective criteria*" because they do not yet know what they don't know (34).

A 2010 Universiti Kebangsaan Malaysia study of preceptors' assessment of pharmacy graduates' competency in five technical areas, as well as competency in soft skills (35). The results showed that the mean preceptor rating was above average for all the areas. The highest ratings were for out-patient services competencies and ability to maintain a proper attitude to work and lowest ratings were for clinical pharmacy competencies and ability to problem solve in ethical issues.

The final study, conducted in the Caribbean, explored stakeholders' views of graduates' performance on entering the workforce (36). The findings of this study were generally positive, with quantitative assessment rating the graduates' performance in

the majority of areas above the hypothetical mean of 2.5 on a 5-point Likert scale. However the scores were not as high as identified in the Malaysian study (35). Open ended-questions and focus groups further revealed that stakeholders felt that graduates required more training in several areas, including clinical skills, empathy, leadership and team-building skills, and practical experience.

One plausible explanation for the lack of literature in this area may be that the majority of articles written related to pharmacy education and curricula come from high-income countries. The regulation of pharmacy training is high in such countries and national bodies are responsible for assuring not only the quality of training but also its appropriateness to current pharmacy practice. For example, the Accreditation Council for Pharmacy Education provides standards for what content, skills, and abilities should be included in Doctor of Pharmacy education in the United States and in the United Kingdom the General Pharmaceutical Council provides standards for the initial education and training of pharmacists (37). In low and middle-income countries, the situation is not necessarily the same, especially in countries such as Namibia, which have only recently started training their own pharmacists.

Broadening the literature search to assessment of appropriateness of other health care professions curricula (namely medicine, nursing and "health worker") there was again a shortage of studies assessing whether implemented curricula were appropriate to health needs. Two studies were identified from Ethiopia, regarding competence of graduates from midwifery and anaesthetist training programmes (38,39). Assessment of competence for both studies were done using OSCEs. The average overall score for the almost 500 students completing their studies in midwifery was 52%, with only a third of students reaching the required 60% in the OSCE to pass the assessment (38). The students graduating from the anaesthetist training (n=122) fared somewhat better

with an overall mean score of 61%, but the mean score for two important competencies, namely routine anaesthesia machine check and preoperative screening assessment were below 50% (39). It should be highlighted that both these studies were baseline assessments for a USAID-funded Strengthening Human Resources for Health Project in Ethiopia, due to identified weaknesses in the country's health workforce being unable to meet the population needs (38,39). A further broad assessment of health training curricula funded by USAID was conducted in Kenya, and included, among other aims, stakeholders' views of student health workers' preparedness for clinical practice (40). The study revealed that stakeholders felt that the curricula did not adequately prepare students for any of the eight different work place settings included in the study, with the lowest rating being only a third of respondents believing the curricula adequately readied students to practice in an emergency setting.

2.4. Competency-based training of health professionals

The UNAM BPharm curriculum being assessed in this study is competency-based, therefore current literature around this topic was reviewed. Competency-based education (CBE) is now widely used among training of health care professions, in order to ensure that the resultant health care professionals are "fit for purpose", aiming to meet societies health needs and lead to improved health outcomes for the populations served (41,42). Changing educational approaches from the traditional knowledge-based systems, previously favoured widely in tertiary education institutions globally, to CBE has been necessitated to address weaknesses identified by the Lancet Commission (2010) and the WHO 2013 report "A universal truth: no health without a workforce" (16,43).

The traditional view of knowledge as a dichotomy of "knowing that" and "knowing how", and the idea that students should be taught theory related to their profession and then learn how to "translate" this theory into practice is contested by Andrew Gonczi in his 2013 publication, "*Competency-Based Approaches: Linking theory and practice in professional education with particular reference to health education*" (44). Gonczi highlights that, in order to be able to practice effectively in real world situations, professionals' decision-making is informed by a combination of reasoning and emotions. The reasoning is based on personal knowledge from previous experiences, cultural knowledge and knowledge from other sources available in the work place, such as records or manuals. However the emotional component of a professionals decision-making is controlled by the pre-frontal cortex, which "only develops with experience and experimentation" (44). Therefore, for effective professional education, that results in development of the required competencies, it is essential that work-integrated learning are built into the curriculum, starting from early in the student's training, so that they can effectively integrate propositional knowledge and "know how" by experiencing real-life situations. Gonczi also highlights the importance of assuring the quality of students' practical experience, to optimise learning from these periods (44).

Although CBE has been widely used by various health professions for several decades, its use in pharmacy has been more recent, with little published about competence standards or competence assessment in the field of pharmacy before the year 2000 (45). However, in the last fifteen years there has been considerable uptake globally of CBE in Pharmacy Schools, as well as adoption of competency frameworks (including the FIP Global Competency Framework) and national entry into practice requirements that are competency-based (41,45,46). Given that in many countries globally

Pharmacy Education has been long established, the move to CBE has required considerable changes in curricula design as well as educational practices and therefore can only be successfully completed with wide stakeholder and academic leadership support (42,46). In 2017, Koster *et al* published step-by-step guidance on how to effectively implement CBE in pharmacy pre-service education (46). This publication highlights various best-practices, including (in support of Gonczi's arguments), the importance of integrating course content and skills in order for students to be able to develop the necessary professional competences that require cognitive and non-cognitive skills in addition to knowledge. They also stress the need for an agreed upon competency framework and authentic pharmacy tasks to be used for assessments as these can both motivate the students as well as preparing them for professional life (46).

A competency framework is essential to effective CBE, as it guides the development of learning outcomes and the leaning and assessment methods that will enable students to reach these outcomes. The framework used should not be static, given that it should meet the needs of the population to be served and the rapidly changing health landscape and health professionals roles that we are experiencing (41,42). As highlighted by Bruno-Tomé and colleagues, no one competency framework model fits all and there needs to be flexibility and adaptability to meet changing health care needs (41).

Appropriate assessment of competence is another key factor in effectively implementing CBE, requiring considerable change from the traditional educational models. Given that assessment drives learning, in that students put more effort into learning activities they know will be assessed, it is essential that assessment considerations are integral to any curriculum changes. Newble and Jaeger as far back

as 1983, described the inadvertent effect that changing assessment methods had, when a curriculum change that was intended to reduce emphasis on didactic learning in the final year of a medical degree, actually resulted in students spending more time on didactic learning (47). Assessment of competence is not a straightforward matter and ideally it should be aimed at the peak of Miller's pyramid, where the student demonstrates "clinical performance" during assessment in a clinical setting (48). However, this is not practical in the majority of cases, given growing class sizes and the limited availability of clinical instructors and venues for clinical rotations. Therefore the most common form of assessment of competency now employed in medical and other health professions education, including pharmacy, is the Observed Structured Clinical Examinations (OSCEs) which are at level three of Miller's pyramid, where the student "shows how" by performing the required tasks appropriately (42,49,50). OSCEs have been so widely adopted because they allow assessment of students' competence in interpersonal and communication skills, clinical skills, as well as professional judgement and problem solving skills, that are not adequately assessed in either written or oral examinations (50). Furthermore, there is significant literature, dating back to the 1970s, supporting the objectivity, reliability and validity of well-designed OSCEs (51–54). Nevertheless, OSCEs should complement other forms of assessments, rather than replacing them, because it is not possible for OSCEs to assess the full breadth of a student's competence (55,56). This is what the Pharmacy Council of Namibia implemented when, in 2016, they deliberately added OSCEs to the Pharmacy interns' assessments. This was done to ensure that, before registration as a pharmacist, all interns have the required competence, not just knowledge to pass written assessments.

2.5. Theoretical Framework

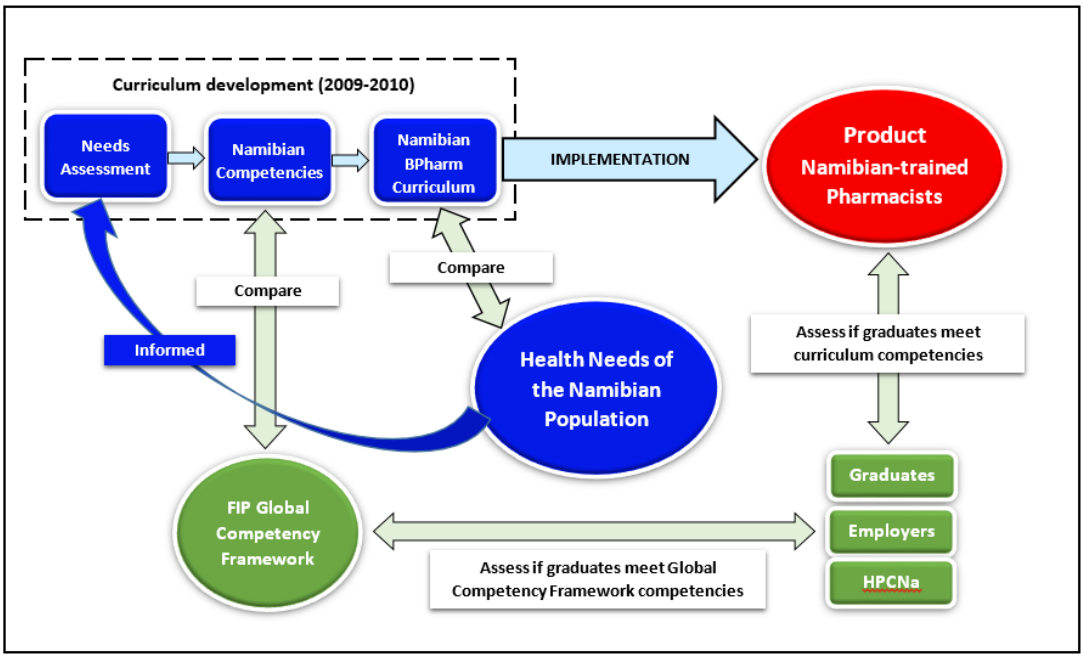


Figure 1. Theoretical Framework

The above theoretical framework (Figure 1) shows the UNAM BPharm curriculum development process which was informed by the health needs of Namibia (3). This current research assessed whether the curriculum is appropriate for Namibia's health needs, as well as comparing UNAM BPharm graduates' competences with both the UNAM BPharm curriculum competences (57) and the FIP Global Competency Framework (28).

2.6. Summary

There is a global shortage of human resources for health, which requires urgent action. The workforce shortages make it even more critical that health professionals receive training that prepares them for the roles they will fulfil once qualified. This literature review highlights that there is a major gap in published literature on the appropriateness of health professionals training to meet the health needs of the populations served. Given the wealth of high-level statements by various health and

health professions organisations about the importance of training health workers to meet population needs, this is surprising. There have been significant changes to approaches used for training health professionals over the last three decades, with the introduction of competency-based education. It appears that the majority of educational and professional bodies assume that assessment of competence against an agreed upon competence framework is a suitable measure of appropriateness of health worker curricula and training, although this assumption is not stated or examined for accuracy.

CHAPTER 3. RESEARCH METHODS

The study was approved by the research ethics committees of both the University of Namibia (Appendix A) and that of the Ministry of Health & Social Services (Appendix B).

The research involved two parts, namely a cross-sectional survey and analysis of results from the Pharmacy Council of Namibia's intern assessments.

For the sake of clarity, the methods for each part of the study are described separately.

3.1. Cross-sectional survey

3.1.1. Research Design

A web-based, quantitative questionnaire was sent to all UNAM BPharm graduates and all pharmacists registered in Namibia, to assess;

Specific Objective 1.3.1: To quantify the appropriateness of the pharmacy curriculum from key stakeholder perspectives.

Specific Objective 1.3.2: To describe the level to which UNAM BPharm graduates demonstrate locally identified and internationally accepted competencies.

3.1.2. Sample

All UNAM BPharm graduates (N=111), and all pharmacists registered in Namibia (N=615, including UNAM graduates) were requested to complete the questionnaire on the appropriateness of curricular content. Response rates to online surveys have been shown to be approximately 10% lower than other surveys (58). The study aimed to get responses from 30% of the population, 185 pharmacists, including 37 UNAM graduates.

3.1.3. Research Instrument

The free, web-based software, Google Forms® was used to develop a master questionnaire with seven sections. Section 1 provided background information about the study as well as risks and benefits of participating in the survey and then asked respondents whether they consent to be involved in the study; Section 2 thanked respondents who did not consent to participate in the study, for their time and directed them how to exit the survey. Section 3 included questions on socio-demographic characteristics of respondents, as well as whether they had worked with any UNAM BPharm graduates. Based on their response as to whether they work / have worked with UNAM BPharm graduates or are a UNAM BPharm graduate, respondents were then directed to the appropriate section. Section 4 asked respondents who have worked with UNAM BPharm graduates to give more information on the roles and duration of working with UNAM BPharm graduates. Section 5 asked respondents who have worked with UNAM BPharm graduates to rate the graduates' competence in four different domains. Section 6 asked UNAM BPharm graduates to rate their own competence in the same four different domains and finally Section 7 asked all respondents to rate the appropriateness of fifteen different modules in the BPharm curriculum, to current health needs in Namibia, from their perspective. Ten different versions of the master questionnaire were constructed, with the only difference between each version being in Section 7, where the respondents were asked to rate different modules. Different versions of the questionnaire were needed, because each survey asked respondents to rate the appropriateness of fifteen out of 37 modules in the UNAM BPharm curriculum. There was no way to make sure that the same responses would be received from any of the versions of the questionnaire, and therefore many different iterations of the questionnaire were produced that included

different modules to be assessed, to optimise the likelihood of a fair distribution of ratings for each different module. See Appendix C for screen shots of Survey 1 (an example of ten versions of the questionnaire; see explanation in Section 3.1.4) as was completed by respondents.

3.1.4. Procedure

The confidential, web-based questionnaire was tested for face validity and piloted by colleagues of the main investigator. Feedback from the pilot led to some changes in wording of the questions and addition of answer options, to ensure that all respondents were able to respond appropriately to the questions posed.

Once these changes had been made to the master questionnaire, ten (10) different versions of the questionnaire were made, that asked respondents to rate the appropriateness of fifteen different modules in the UNAM BPharm curriculum.

See Appendix D for descriptions of all modules included in the study. Foundational science modules (12) and UNAM core modules (3) were excluded. The foundational science modules were excluded due to the fact that it may be difficult for pharmacists not in academia to appropriately identify the relevance of such modules to their current practice. The core modules were excluded because they are compulsory for all UNAM degree courses. Once ethical approval had been granted for the study by both the University Research and Ethics Committee and the Ministry of Health and Social Services, the Pharmacy Council of Namibia (under the Health Professions Council of Namibia) was approached to get contact details of all pharmacists registered in Namibia. Additionally, UNAM School of Pharmacy records were used to gather email addresses for all BPharm graduates.

A comprehensive list of email addresses was compiled and used to allocate which version of the Questionnaire would be sent to which pharmacists via email. See

Appendix E for example of the emails sent out to all pharmacists. Confidentiality of pharmacists' email addresses was maintained at all times, by using the blind curtesy copy function when sending emails.

All efforts were made to correct email addresses which were rejected, by getting email addresses from the Pharmaceutical Society of Namibia, as well as by phoning the contact numbers included in the Register for pharmacists. Follow-up, reminder emails were sent out to respondents after four weeks, and a final reminder was sent after a further two weeks.

3.1.5. Data Analysis

All responses from the different versions of the online questionnaires were automatically saved in individual google sheets as they were received. A master google sheet was then created, combining all responses from the various versions of the questionnaires. This master sheet of all responses was then exported to excel for cleaning.

Cleaning of the survey data involved firstly removing duplicate responses. This was done initially by searching for responses that were made by respondents with the same email address. However, as the provision of an email address when completing the survey was optional, and no other respondent identifying information was collected, many of the responses were anonymous. Further identification of duplicates was done by identifying responses that had the same demographic data, such as age, year of graduation, university attended and current field of practice.

Once duplicate responses had been removed, all remaining responses were organised in excel in such a way that the modules rated by the different versions of the questionnaire were aligned. This data was then imported into Prism Graph Pad ™ version 9.0.0 (121) for analysis and visual presentation.

3.1.6. Ethical Considerations

Respect for Autonomy: Participation in the survey was voluntary; no coercion was applied and informed consent was requested prior to participation. All data collected during the survey has been kept secure and confidential. All data collected is stored on the researcher's password protected computer that is held in a locked office on the security guarded UNAM Hage Geingob Campus. Data will be retained for five years before destruction.

Beneficence: This study has been conducted in order to improve undergraduate training of pharmacists in Namibia, which will lead to improved healthcare services being provided to the population. All steps have been taken to ensure that no harm will occur to any of the participants in this study.

Non-maleficence: This ethical principal has been upheld by rigorous enforcement of confidentiality throughout the study, hence minimising the risk of causing pain, suffering or offence to any of the participants. Additionally, the researchers have not used (and will not in the future use) information revealed by participants for any purpose other than the stated purpose, as described in the informed consent provided to participants at the start of the survey. Moreover, no punitive action has been taken (or will be taken in the future) against any participant for expressing views that differ from those of the researchers, especially with regards to any expressed weaknesses in the UNAM BPharm programme or its graduates.

Justice: All participants in this study have been treated fairly and equitably. Moreover, extreme care has been taken throughout this study to ensure that the results are a true reflection of the information gathered, which in turn ensures that the findings of this study are evidence based.

3.2. Analysis of Pharmacy Council's internship examination results

3.2.1. Research Design

Quantitative analysis of internship results was carried out to identify associations between marks in the internship exam and independent variables including university the candidate graduated from, year of graduation, gender and age category of the candidates.

3.2.2. Sample

All results from internship exams taken between 2015 and 2019 were included.

3.2.3. Research Instruments

A Microsoft Excel spreadsheet was used as the data coding tool to collect data from the internship exam results provided by the Pharmacy Council. See Appendix F for the data coding tool.

3.2.4. Procedure

Once ethical approval had been granted for the study by both the University Research and Ethics Committee and the Ministry of Health and Social Services, the Pharmacy Council of Namibia (under the Health Professions Council of Namibia) was approached to get a copy of the current Pharmacists' internship exam results from 2015 and 2019.

3.2.5. Data Analysis

The data was cleaned and combined into one Excel sheet using the data coding tool (Appendix F). This data was then analysed using Excel 2016 Analysis ToolPak®.

3.2.6. Ethical Considerations

Respect for Autonomy: All data collected from the Pharmacy Council were kept secure and confidential and personal identifying information was removed from the data before analyses. The data were stored on the researcher's password protected computer

that is stored in a locked office on the security guarded UNAM Hage Geingob Campus. Data will be retained for five years before destruction.

Beneficence: This study was conducted with the aim to improve undergraduate training of pharmacists in Namibia, which will, in turn lead to improved healthcare services being provided to the Namibian population. All steps have been taken to ensure that no harm will occur to any of the participants in this study.

Non-maleficence: This ethical principal has been upheld by rigorous enforcement of confidentiality throughout the study that has minimised the risk of causing pain, suffering or offence to any of the participants. Additionally, the researchers have not (and will not in the future) use information obtained from the Pharmacy Council for any purpose other than the stated purpose.

Justice: Extreme care has been taken throughout this study to ensure that the results are a true reflection of the information gathered, thus ensuring that the findings of this study are evidence based.

CHAPTER 4. RESULTS

4.1. Cross-sectional Survey

4.1.1. Pharmacists Registered in Namibia

The Register of Pharmacists received from the Pharmacy Council (one of the health professions councils under the umbrella body Health Professions Councils of Namibia, HPCNA) contained names of 615 registered pharmacists. Two (2) names were removed as they were known to be deceased and a further three (3) names were removed as no email address or contact phone number was provided. Of the remaining 610 pharmacists, five (5) had two email addresses listed.

4.1.1.1. Organisation of the Register

Before using the register to send out the survey, the sector in which each pharmacist works was estimated, based upon the information under the "Business Name" column of the Register. Ninety-four (94) pharmacists on the register had no information listed under the column "Business Name". The register was then re-organised according to the sector the pharmacists worked in before allocating which version of the survey would be sent to which pharmacist. This was done in order to make sure that all modules were assessed by pharmacists working in different sectors, as the appropriateness to a pharmacist's current practice, for any given module, can be affected by which sector of pharmacy the pharmacist is employed in.

4.1.1.2. Demographics of Registered Pharmacists Population

Table 1 below provides the demographic details of pharmacists on the HPCNA Register. The gender distribution of the 610 pharmacists on the register was 56% female and 44% male. The largest number of pharmacists (289, 47%) were employed in the Community Pharmacy sector (also known as Retail Pharmacy), followed by the public sector (118, 19%). Public Sector included all public health facilities, medical

stores as well as services such as Regulation, Quality Surveillance Laboratory, and Programme Managers at National Level. It was not possible to identify from the register where in the public sector the majority of these pharmacists worked, as the Business Name for the majority of these 118 pharmacists (93) was listed as Ministry of Health and Social Services. The next most common sectors of employment were Private Hospital (49, 8%) and Wholesale (35, 6%).

Assessment of the number of years pharmacists had been registered in Namibia revealed that over a third of pharmacists (215, 35%) had been on the register for more than 10 years, 14% (85) had been registered 7-10 years, 27% (164) for 4 – 6 years, 22% (132) for 1-3 years, and 2% (14) for less than a year. The Register includes pharmacists of 27 different nationalities, with, as would be expected, the largest number, 52% (319) being Namibian, followed by 18% (110) from Zimbabwe and 10% (61) from South Africa.

Table 1. Demographics of Pharmacists on HPCNA Register

	Number	%	Cumulative %		Number	%	Cumulative %
Gender				**Nationality**			
Female	343	56%	56%	Namibia	319	52%	52%
Male	267	44%	100%	Zimbabwe	110	18%	70%
Total	***610***	***100%***		South Africa	61	10%	80%
Sector*				Ethiopia	18	3%	83%
Community	289	47%	47%	Nigeria	13	2.1%	85.4%
Public sector	118	19%	67%	Tanzania	12	2.0%	87.4%
Private Hospital	49	8%	75%	Zambia	12	2.0%	89.3%
Wholesaler	35	6%	80%	DRC	9	1.5%	90.8%
Academia	9	1%	82%	Kenya	8	1.3%	92.1%
Other	9	1%	83%	Lesotho	8	1.3%	93.4%
Industry	7	1%	85%	Uganda	7	1.1%	94.6%
Not specified	94	15%	100%	Cuba	5	0.8%	95.4%
Total	***610***	***100%***		Germany	4	0.7%	96.1%
Years on Register				Malawi	4	0.7%	96.7%
More than 10 years	215	35%	35%	Pakistan	4	0.7%	97.4%
7-10 years	85	14%	49%	Other	16	2.6%	100.0%
4 - 6 years	164	27%	76%	***Total***	***610***	***100%***	
1-3 years	132	22%	98%				
Less than 1 year	14	2%	100%				
Total	***610***	***100%***					

* Sector information was estimated, based upon information in the “Business Name” column of the Register

4.1.2. Demographics of Survey Respondents

A total of 216 responses were received to the survey, six (6) of which were identified as duplicate responses and were therefore removed before analysis of the data. Table 2 below shows the detailed demographics of the survey respondents.

The gender distribution of the 210 respondents was 58% female, 41% male and one respondent preferred not to state their gender. The largest number of respondents (83, 40%) were employed in the Community Pharmacy sector, followed by the public sector (75, 36%). Public Sector included all public health facilities, medical stores as well as services such as Regulation, Quality Surveillance Laboratory, and Programme Managers at National Level of the Ministry of Health and Social Services. The next most common sectors of employment were Private Hospital (21, 10%) and Wholesale (11, 5%).

Analysis of the number of years respondents had been practicing pharmacy showed that over a third of pharmacists (80, 38%) have worked in pharmacy practice for more than 10 years, 17% (36) have practices for 4 – 6 years, 20% (43) for 1-3 years, 14% (30) for 7-10 years and 10% (21) for less than a year.

The survey respondents included pharmacists from 21 different countries, with, as would be expected, the majority, 60% (126) being Namibian, followed by 17% (35) from Zimbabwe, 4% (8) from Ethiopia and 2% (5) from South Africa.

Table 2. Demographics of survey respondents

	Number	%	Cumulative %
Gender			
Female	122	58%	58.1%
Male	87	41%	99.5%
Prefer not to say	1	0.5%	100.0%
Total	***210***	***100%***	
Sector			
Community	83	40%	40%
Public sector	75	36%	75%
Private Hospital	21	10%	85%
Wholesale	11	5%	90%
Academia	5	2%	93%
Industry	3	1%	94%
Other	12	6%	100%
Total	***210***	***100%***	
Years of Practice			
More than 10 years	80	38%	38%
7 - 10 years	30	14%	52%
4 - 6 years	36	17%	70%
1 - 3 years	43	20%	90%
Less than 1 year	21	10%	100%
Total	***210***	***100%***	
Nationality			
Namibia	126	60%	60%
Zimbabwe	35	17%	77%
Ethiopia	8	4%	80%
South Africa	5	2%	83%
Zambia	5	2%	85%
Lesotho	4	2%	87%
Nigeria	4	2%	89%
Tanzania	4	2%	91%
Malawi	3	1%	92%
Other	16	8%	100%
Total	***210***	***100%***	

	Number	%	Cumulative %
University attended			
UNAM	72	34%	34%
North-West University, Potchefstroom	27	13%	47%
University of Zimbabwe	22	10%	58%
Rhodes University	19	9%	67%
University of the Western Cape	10	5%	71.4%
University of Nairobi	9	4%	75.7%
Nelson Mandela Metropolitan University	5	2%	78.1%
Addis Ababa University, Ethiopia	4	2%	80.0%
University of Zambia	3	1%	81.4%
University of Pretoria	3	1%	82.9%
Other	36	17%	100.0%
Total	***210***	***100%***	
Highest Pharmacy Qualification			
BPharm	162	77%	77%
Masters	33	16%	93%
PhD	5	2%	95%
Pharm. D.	1	0.5%	95.7%
Postgraduate Diploma (various)	8	3.8%	99.5%
Other	1	0.5%	100.0%
Total	***210***	***100%***	

4.1.2.1. Comparison of Demographics of Registered Pharmacists and Survey Respondents

In order to confirm that the pharmacists who completed the survey were representative of all pharmacists registered in Namibia, the demographics of the registered pharmacists and survey respondents were compared. See details in Table 3 below. Females made up 56% of registered pharmacists compared to 58% of respondents to the survey. The Sector of employment of the respondents closely matches the sector of employment deduced from the Register. Note that the sector of employment for registered pharmacists was deduced from the listed business name on the register. The one significant difference in sector of employment between the Register and the

Survey respondents is the Public Sector, with 36% of respondents working in the public sector compared to only 19% of pharmacists on the register. However, on the register the business name was not stated for 97 out of the 610 pharmacists registered (16%).

Table 3. Comparison of HPCNA Register and survey respondents' demographics

	HPCNA Register	Survey Respondents	Difference
Gender			
Female	56%	58%	2%
Male	44%	41%	-3%
Prefer not to say	-	0.5%	1%
Total	***100%***	***100%***	
Sector*			
Community	47%	40%	**-7%**
Public sector	19%	36%	**17%**
Private Hospital	8%	10%	2%
Wholesaler	5.7%	5.2%	-1%
Academia	1.5%	2.4%	1%
Other	1.0%	5.7%	5%
Industry	1.1%	1.4%	0%
Not specified	16%	0%	**-16%**
Total	***100%***	***100%***	
Years Registered / Years of Practice†			
More than 10 years	35%	38%	3%
7-10 years	14%	14%	0%
4 - 6 years	27%	17%	**-10%**
1-3 years	22%	20%	-2%
Less than 1 year	2%	10%	**8%**
Total	***100%***	***100%***	
Nationality			
Namibia	52.3%	60%	**8%**
Zimbabwe	18%	17%	-1%
South Africa	10%	2%	**-8%**
Ethiopia	3.%	4%	1%
Nigeria	2.1%	2%	0%
Tanzania	2.0%	2%	0%
Zambia	2.0%	2%	0%
DRC	1.5%	0%	-2%
Kenya	1.3%	0%	-1%
Lesotho	1.3%	2%	1%
Other	6.6%	9%	2%
Total	***100%***	***100%***	

* Sector information from the Register was estimated, based on information in the "Business Name" column

† Years Registered data from the Register and Years of Practice (since registration) from the survey results

4.1.3. Analysis of Survey Results

4.1.3.1. Rating of Appropriateness of Modules to Current Pharmacy Practice

All respondents to the survey (N=210) rated the appropriateness of modules to their current pharmacy practice using a scale of one to five, where one relates to "Not appropriate at all" and five to "Very appropriate". Each respondent rated 15 of the 37 modules and by including different modules in the various versions of the survey, all 37 modules were rated. The number of ratings per module ranged from 52 to 103, with a mean of 84 (SD=12.26). The difference in number of ratings per module was due to the fact that the researcher had no control over how many pharmacists responded to each of the ten versions of the survey.

There was general agreement between respondents regarding how appropriate the majority of modules are to their current pharmacy practice. The mean rating for the different modules ranged from 3.71 to 4.74 (out of maximum rating of 5), as displayed in Figure 2. The error bars included in Figure 2 are one standard deviation in each direction of the mean, and the dotted line at appropriateness rating four is for visual reference, as the majority of modules have a mean rating above four.

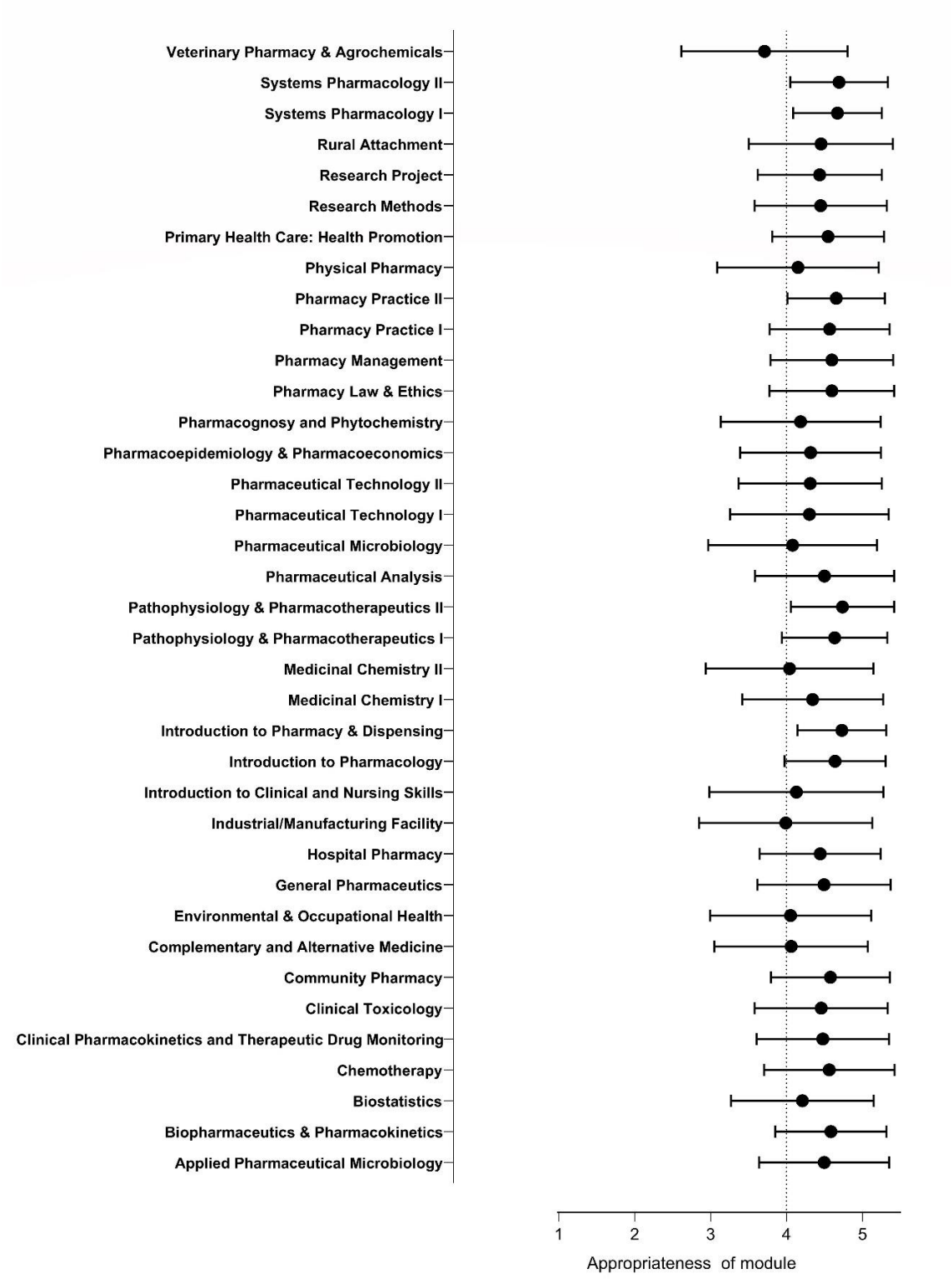


Figure 2. Mean appropriateness rating for each module

Key:	•	the mean appropriateness rating for each module.
	1	not appropriate at all
	5	very appropriate
	Error bars	represent 1 standard deviation of mean in each direction
	Dotted line	indicates rating of four out of five

4.1.3.2. Rating of UNAM BPharm Graduate Competencies

Respondents that have experience of working with one or more UNAM BPharm graduates, rated the competence of those UNAM BPharm graduates, using competences based on the International Pharmacy Federation's Global competence framework (28). The scale used rated 1 as "Not competent at all" and 5 as "Highly competent".

Ninety-five (95) respondents replied that they had experience of working with UNAM BPharm graduates, with slightly over half (53%) having worked with a UNAM BPharm graduate for less than 2 years and 47% having worked with a UNAM BPharm graduate for between two and six years; see Table 4 below. Respondents were asked about the role or roles they had while working with UNAM BPharm graduates, whether as an intern tutor, a Supervisor or employer or as a colleague that was neither a supervisor or employer. Table 5 shows that three (3%) respondents had three different roles, 20 (21%) had two different roles and the remainder (72, 76%) had played one role while working with UNAM BPharm graduates. The roles played by the respondents were fairly equally divided between intern tutor, supervisor/employer and colleague that is not a supervisor/employer (see Table 6 below).

Table 4. Duration respondents have worked with a UNAM BPharm graduate

Years	Count	%
Less than 1 year	30	32%
1 year	20	21%
2 years	11	12%
3 years	15	16%
4 years	6	6%
5 years	9	9%
6 years	4	4%
Total	**95**	**100%**

Table 5. Number of roles held by respondents working with UNAM BPharm graduates

Number of Roles held	Count of respondents	%
3 roles	3	3%
2 roles	20	21%
1 role	72	76%
Total	**95**	**100%**

Table 6. Different Roles survey respondents had worked with UNAM BPharm graduates

Roles	Count	%
Works / has previously worked with a UNAM BPharm graduate (not as a supervisor / employer / tutor)	44	36%
Currently is / has previously been the Supervisor or Employer of a UNAM BPharm Graduate	41	34%
Currently is / has previously have been an Intern tutor of a UNAM BPharm Graduate	36	30%
Total	**121**	**100%**

The mean competency rating across all domains was 3.3 (SD=0.24) with the highest mean rating (3.7) for competency in dispensing and the lowest mean rating (2.8) for competency in budget management. See Table 7 below for details of the competencies and the mean ratings (and standard deviations) respondents gave. The same information is also provided in chart format in Figure 3, to facilitate visualisation of the results.

4.1.3.3. Self-Rating of UNAM BPharm Graduate Competencies

Respondents that were UNAM BPharm graduates, rated their own competence, using the same competences as above. Forty-nine (49) respondents to the survey rated their own competence. The scale used rated 1 as "Not competent at all" and 5 as "Highly competent".

The mean self-competency rating across all domains was 4.0 (SD=0.24) with the highest mean rating (4.3) for competency in Legal, Professional and Ethical Practice and the lowest mean rating (3.4) for competency in budget management.

Table 7 details the competencies and mean self-assessed competence ratings reported by the UNAM BPharm graduate respondents. Figure 3 provides the information in

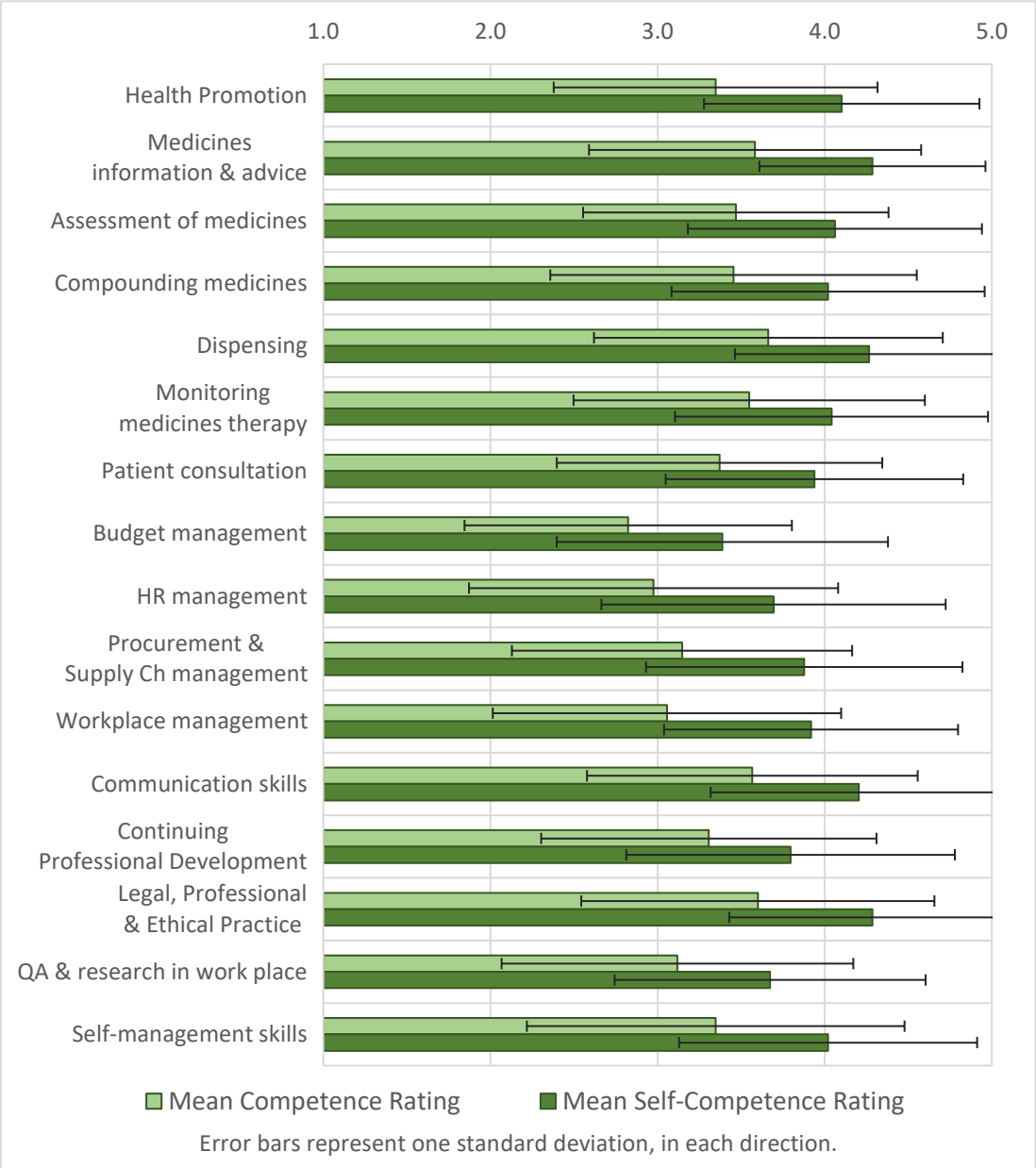
graphical format to facilitate visualisation of the results, especially the difference between the competence and self-assessed competence ratings.

Table 7. Competence and self-competence ratings

		Competence Rating		Self-Competence Rating	
Competencies	**Behaviour**	**Mean**	***STD***	**Mean**	***STD***
1. Domain: Pharmaceutical Public Health					
1.1 Health Promotion	Assesses primary health care needs, advises on health promotion, disease prevention and control, and healthy living	3.4	*0.97*	4.1	*0.82*
1.2 Medicines information and advice	Counsels population on rational use of medicines and is able to identify sources, retrieve, evaluate, organise and provide relevant medicines information according to the needs of patients	3.6	*0.99*	4.3	*0.68*
2. Domain: Pharmaceutical Care					
2.1 Assessment of medicines	Appropriately selects medicines according to patient and local policies (including for minor ailments). Identifies and acts upon medicine interactions	3.5	*0.91*	4.1	*0.88*
2.2 Compounding medicines	Prepares medicines appropriately (e.g. extemporaneous) including calculations, formulation and procedures	3.5	*1.10*	4.0	*0.94*
2.3 Dispensing	Accurately dispenses medicines as prescribed or for minor ailments, validates prescriptions, labels medicines, documents and acts on dispensing errors	3.7	*1.04*	4.3	*0.80*
2.4 Monitoring medicines therapy	Applies local guidelines and protocols, ensures therapeutic medicines monitoring and identifies and resolves medicines management problems	3.6	*1.05*	4.0	*0.94*
2.5 Patient consultation	Appropriately assesses patients' needs, including medication and disease history, discusses and agrees with the patients the appropriate use of medicines, documents interventions and updates relevant records	3.4	*0.97*	3.9	*0.89*
3. Domain: Organisation and Management					
3.1 Budget management	Effectively sets and applies budgets and ensures financial transparency	2.8	*0.98*	3.4	*0.99*
3.2 Human Resources management	Demonstrates effective HR management and people skills, to ensure good pharmacy and multi-disciplinary team work, recognises potential of individuals and facilitates continuing professional development	3.0	*1.10*	3.7	*1.03*
3.3 Procurement & supply chain management	Ensures availability of most cost-effective, quality medicines from reliable suppliers through accurate quantification, effective store management and record keeping	3.2	*1.02*	3.9	*0.95*
3.4 Workplace management	Addresses day to day management issues, demonstrates ability to take appropriate and timely decisions and ensures work time is planned and managed to optimise provision of pharmaceutical services	3.1	*1.04*	3.9	*0.88*
4. Domain: Professional and Personal					
4.1 Communication skills	Communicates clearly and appropriately with health care staff, patients and carers, demonstrates cultural sensitivity and tailors communications to patients needs	3.6	*0.99*	4.2	*0.89*
4.2 Continuing Professional Development (CPD)	Documents CPD activities, evaluates currency of knowledge and skills, identifies learning needs and acts upon them and reflects on performance	3.3	*1.00*	3.8	*0.98*

		Competence Rating		Self-Competence Rating	
Competencies	**Behaviour**	**Mean**	***STD***	**Mean**	***STD***
4.3 Legal, Professional and Ethical Practice	Understands and applies pharmaceutical legislation, adheres to code of ethics, ensures confidentiality and takes responsibility for own actions	3.6	*1.06*	4.3	*0.86*
4.4 Quality Assurance & research in work place	Audits quality of service, implements and develops Standard Operating procedures, applies research findings to improve use of medicines and implements pharmacovigilance reporting system	3.1	*1.05*	3.7	*0.93*
4.5 Self-management skills	Demonstrates leadership, initiative and efficiency, ensures punctuality, prioritises work and implements innovative ideas	3.4	*1.13*	4.0	*0.89*
	Maximum	*3.7*	*1.13*	*4.3*	*1.03*
	Minimum	*2.8*	*0.91*	*3.4*	*0.68*
	Mean	*3.3*	*1.03*	*4.0*	*0.90*
	STD	*0.24*		*0.24*	

Figure 3. Mean competency and self-competency ratings displayed graphically



4.1.4. Additional comments made by respondents (related to the appropriateness of the UNAM BPharm curriculum)

Respondents were asked to make any additional comments they had regarding the appropriateness of the curriculum to pharmacy practice in Namibia and any general comments the respondents wish the researchers to take into consideration. From the 210 respondents, a total of 110 comments were made and these were grouped according to themes; see Table 8 below for the distribution of comments by theme and

Appendix G for all comments made and the themes they were allocated to by the lead researcher.

Table 8. Distribution of respondents' comments by theme

Theme	Count (%)	%
Curriculum is appropriate	19	17%
Extend BPharm programme to 5 years	8	7%
Suggested enhancements to curriculum	46	42%
Miscellaneous comments	37	34%
Total	**110**	**100%**

Many of the comments in the miscellaneous theme were suggesting inclusion of modules that are already covered in the BPharm curriculum. This results from the fact that each respondent was only asked to rate the appropriateness of 15 modules, rather than all the modules in the curriculum. This decision was made because it was felt that the survey would be too long if respondents had to rate all the modules.

Specific enhancements suggested by respondents were grouped according to topics. Several of the comments made suggested more than one enhancement, so respondents' comments were broken down into individual suggestions for analysis. This resulted in 71 different enhancement suggestions. The most common enhancements suggested were improving students' business, management and leadership skills (including financial and people management), pharmaceutics skills, calculation skills, increasing students clinical contact time, introducing students to the specific dispensing software used in Namibia, and strengthening their knowledge of industrial pharmacy. Further topics that were suggested to be added to the curriculum were pharmaco-economics, radio-pharmacy, antimicrobial resistance, wholesale pharmacy, cosmetology and epidemiology, while three respondents suggested the placement modules should be extended. Table 9 below gives a summary of the enhancements suggested by respondents. The full comments received are attached in Appendix G.

Table 9. Topics respondents suggested should be added or strengthened in the current UNAM BPharm curriculum

Suggestions to add / strengthen in curriculum	Count	Suggestions to add / strengthen in curriculum	Count
Business, management & leadership	13	Antimicrobial resistance	1
Calculations	5	Biopharmaceuticals	1
Clinical contact	5	Clinical supplies	1
Pharmaceutics	5	Complementary & alternative medicines curriculum to focus locally	1
Dispensing software	4	Cosmetology	1
Industrial pharmacy	4	Epidemiology	1
Extend placements	3	Generic substitution	1
Inventory control	3	Increase base level of sciences	1
Pharmaco-economics	3	Increase number of teaching staff	1
Computer skills	2	Medical aids	1
Increase practicals	2	Pharmacology	1
Microbiology	2	Radiopharmaceuticals	1
Pharmacy laws	2	Regulation	1
Veterinary pharmacy	2	Veterinary Pharm placement	1
Wholesale	2		

4.2. Analysis of Pharmacy Council Internship Results

4.2.1. Description of Internship examination results

Data were received from 2015-2019 inclusive, however the mode of assessment of interns changed in 2016, with the introduction of Observed Structured Clinical Examinations (OSCE) replacing the previous written competency examination. Therefore, the five results of intern assessments from 2015 were omitted from the analysis. Assessment of interns from 2016 onwards involved a written Legal examination and an OSCE. In 2018 a written calculations exam was added to the assessments.

The data received from Pharmacy Council was incomplete, due to a previous computer crash and therefore not all results could be retrieved. The majority of interns assessed in 2017 (36 out of 39, 92%) only had a result for the legal examination, and the remaining 3 interns had results for OSCE but not for legal exam.

4.2.2. Analysis of Internship examination results

During analysis of the data it was noted that, in many cases, the marks for one or more assessments were identical on different dates and therefore it is likely that these marks (which were passes) were carried forward and recorded again against the intern's name. An assumption was made that the same result repeated for a particular assessment for any student meant this result was carried forward and therefore these duplicate marks for the same student in the same assessment were removed before analysis of the results.

A total of 120 interns had results recorded in the data provided. Over a quarter of the interns were examined on two different occasions (n=32, 27%). There were 87 marks for Calculations exam from 61 different interns; 129 results for Legal exam from 115 different interns and 85 results for OSCE from 84 different interns.

The mean mark for calculations exam was 75.0% (SD 13.7, Range: 30-100%). The mean mark for legal exam was 63.8% (SD 11.3, Range: 24-89%). The mean mark for OSCE was 67.4% (SD 9.1, Range: 48-89%). See Table 10 below for details of the results of the three different assessments completed by interns that trained at UNAM School of Pharmacy and those trained at other universities.

Further analysis of the results was performed in Excel 2019 using the t-Test: Two-Sample Assuming Equal Variances. This revealed that there was no statistically significant difference between the results for interns who had completed their undergraduate training at UNAM and interns who completed their undergraduate training at other universities in the Calculations and OSCE assessments. However, the interns who trained at UNAM had statistically significant higher results in the Legal Assessment compared to those trained at other universities (t Stat=3.52, *p* two tail = 0.01).

Table 10. Analysis of Intern Assessments by university where the interns trained

Calculations	***UNAM***	***OTHER***	***Combined***
Descriptive statistics			
Mean	73.8	77.5	75.0
Standard Deviation	13.10	15.11	13.77
Range	70	61.9	70
Minimum	30	38.1	30
Maximum	100	100	100
Count	60	27	87
Confidence Level (95.0%)	3.38	5.98	2.93
t-Test: Two-Sample Assuming Equal Variances			
Mean	73.83	77.55	
Variance	171.50	228.22	
Observations	60	27	
Pooled Variance	188.85		
Hypothesised Mean Difference	0		
df	85		
t Stat	-1.17		
P(T<=t) two-tail	0.247		
t Critical two-tail	1.99		
Legal	***UNAM***	***OTHER***	***Combined***
Descriptive statistics			
Mean	66.3	59.3	63.8
Standard Deviation	10.39	11.77	11.37
Range	47	61	65
Minimum	42	24	24
Maximum	89	85	89
Count	83	46	129
Confidence Level (95.0%)	2.27	3.49	1.98
t-Test: Two-Sample Assuming Equal Variances			
Mean	66.34	59.28	
Variance	107.91	138.47	
Observations	83	46	
Pooled Variance	118.74		
Hypothesised Mean Difference	0		
df	127		
t Stat	3.52		
P(T<=t) two-tail*	**0.001**		
t Critical two-tail	1.98		
OSCE	***UNAM***	***OTHER***	***Combined***
Descriptive statistics			
Mean	65.8	69.5	67.4
Standard Deviation	8.27	9.88	9.14
Range	38	41	41
Minimum	50	48	48
Maximum	88	89	89
Count	48	37	85
Confidence Level (95.0%)	2.40	3.29	1.97
t-Test: Two-Sample Assuming Equal Variances			
Mean	65.79	69.49	
Variance	68.34	97.59	
Observations	48	37	
Pooled Variance	81.03		
Hypothesised Mean Difference	0		
df	83		
t Stat	-1.88		
P(T<=t) two-tail	0.064		
t Critical two-tail	1.99		

CHAPTER 5. DISCUSSION

This study used a mixed methods approach to quantify the appropriateness of the current UNAM BPharm curriculum from key stakeholder perspectives and describe the level to which UNAM BPharm graduates demonstrate locally identified and internationally accepted competencies.

The results of this study show that pharmacists in Namibia report the current UNAM BPharm curriculum is appropriate for the health needs of Namibia. This is clearly demonstrated by the mean appropriateness rating for the different modules being 4.4 out of 5 (n=3104, SD=0.92, Median=5, Interquartile Range IQR=1). Furthermore, pharmacists who have experience of working with UNAM BPharm graduates, on average, rated the graduates as competent in all domains, with the lowest mean competency rating (2.8 out of 5) for budget management and the highest mean rating (3.9 out of 5) in dispensing. The study further demonstrates that the methodology used is effective at critically evaluating a health professions curriculum in resource-constrained settings.

5.1. Online survey findings

The high response rate (34.4%; 210 out of all 610 registered pharmacists) paired with the high similarity in respondents' demographics to those of the full Pharmacists' Register held by the Health Professions Councils of Namibia, allows us to generalise the findings of this study to Pharmacists registered in Namibia.

5.1.1. Appropriateness of modules in UNAM BPharm curriculum

As mentioned above, all modules within the current UNAM BPharm curriculum were rated as appropriate overall. This does not mean that every respondent rated each module as relevant. A review of the individual responses showed that the minimum individual rating was 1, that is "not at all relevant", for 25 of the 37 modules assessed.

A closer examination shows that one respondent rated all modules they assessed as "1"; this may have been an error (respondent thinking 1 was highly relevant), or this respondent may have another unknown reason to rate the UNAM BPharm curriculum as not relevant. The respondent stated that they have not worked with a UNAM BPharm graduate before. It is highly unlikely that an unbiased person would find all the modules they assessed, not at all relevant to pharmacy practice in Namibia. If this one response is excluded from the survey only 17 of the 37 modules, have a minimum rating of one.

The high level of appropriateness of the topics taught in the UNAM BPharm found in this study is supported by the needs assessment done by School of Pharmacy in April and May 2021 (59). The graduate survey conducted as part of the needs assessment, revealed that graduates rated the scope of the curriculum content covered as good (three out of four, where one represented very poor and four represented very good). This result is not unexpected, considering the highly participatory approach used to develop the curriculum; a broad range of stakeholders were involved in identifying local needs, developing competencies and building upon these to develop a BPharm curriculum appropriate for Namibia's needs (3). In fact the approach used to develop the UNAM BPharm curriculum, should be seen as best practice, as it utilised many of the strategies recommended by Koster *et al*, for successful implementation of competency-based pharmacy education (46). These strategies include development of a competency framework to meet both the health needs of the population served and local employment needs in the sector, as well as wide stakeholder involvement in the development of the curriculum. The curriculum also integrates content and skills closely from early on in the programme, with experiential learning modules that involved the students spend 3-4 weeks of supervised learning in four different

pharmacy sectors, with the first of these being in the middle of the second year of studies.

The UNAM BPharm curriculum also implements the principles that Palsdottir *et al* identify as central to socially accountable health education (19). Specifically these principles are that the curriculum, research and community service activities are guided by health and social needs of the targeted community; diverse workforce development is ensured by using a regional quota during admission to the programme; interprofessional teaching is central to all UNAM health professional programmes on Hage Geingob campus; and sharing of best practices between countries, that is ensured by collaborations with various other Schools of Pharmacy both within Africa and globally (60).

5.1.2. Competence of UNAM BPharm graduates

The feedback provided by survey respondents on UNAM BPharm graduate competences was from 95 respondents who stated that they currently or previously had worked with a UNAM BPharm graduate. Respondents to this section of the survey were asked to rate the competence of UNAM BPharm graduates they had worked with, across four different domains, based on the FIP Global Pharmacy Workforce Competence Framework (28). Again, a scale of 1-5 was used, where 1 means "Not competent at all" and 5 means "Highly competent". The mean competency rating across all domains was 3.3 (SD=0.24), which is above the mid-point (3) but not as high as the ratings for appropriateness of the modules. However, it should be kept in mind when reviewing this result, that the UNAM BPharm programme only graduated its first students in 2015, and all graduates have to complete a one-year internship before they are registered and deemed competent. This means that of all the 137 students that had graduated from the UNAM BPharm programme when this survey was completed,

34% of them graduated less than 2 years before this survey was done, and 19% had not yet completed their internship. Additionally, 15% (14/95) of those who responded to this section, had only worked with UNAM BPharm graduates as their internship tutor, and had not worked with any UNAM BPharm graduate after they had completed their internship.

According to Kolb's Experiential Learning Theory (61) and the Dreyfus Five-stage Model of Adult Skill Acquisition (62) it is reasonable to expect that competence improves with increasing experience, especially for the first few years of practice after graduation. Takase showed that in the early years of a nursing career there was a rapid increase in competence, followed by slower increase in competence as nurses enter later stages of their career (63). Therefore, it should be expected that the first graduates from the programme (who graduated in 2015) would display higher levels of competence than those who graduated less than 2 years ago. However, one important mechanism for developing appropriate knowledge, skills and attitudes in newly qualified health workers is through feedback from supervisors and peers (64). In Namibia, the opportunities for many UNAM BPharm graduates to receive this essential feedback has been limited due to the shortage of pharmacists, especially in the public sector, where approximately half of the UNAM BPharm graduates are employed (59). However, the situation is improving with more and more pharmacists registering each year and the UNAM taught Master of Pharmacy (Clinical Pharmacy) also provides recent graduates with the chance to build on the competences they gained during their undergraduate degree and internship.

Feedback from work supervisors and other stakeholders as part of the School's needs assessment (59), showed a positive picture of their satisfaction with UNAM BPharm graduates performance. Fifty percent (13/26) of work supervisors rated the UNAM

BPharm graduates as excellent or very good and a further 38.5% (10/26) rated them as good or satisfactory. Stakeholders (N=21) assessed UNAM BPharm graduates readiness to practice ethically, legally, professionally and readiness for patient-centred care practice as excellent or good in all instances where they were able to assess these factors. The only factor that received any satisfactory or poor ratings was for UNAM BPharm graduates "readiness to engage in continuing professional development"; there was one poor and three satisfactory ratings (out of 18 ratings) in this domain.

UNAM BPharm graduates who completed the survey were also given the opportunity to assess their own competence, using the same scale and competence framework. Forty-nine (49) respondents completed this section of the survey, and the mean self-assessed rating for each of the competences was higher than the ratings given by respondents working with UNAM graduates. The overall mean self-assessed rating was 3.97 compared to 3.34 for ratings given by pharmacists working with UNAM BPharm graduates. This difference in competency and self-competency ratings is not surprising, as the understanding of what full competence is grows as a pharmacist's knowledge and skills develop and as mentioned above, the shortage pharmacists in Namibia has limited the level of mentorship available to BPharm graduates. Graduates self-assessed competence being higher than colleagues rating of their competence can be explained by the Dunning-Kruger effect, also known as the confidence-competence curve, which highlights that novices in a field gain confidence rapidly despite low competence and it is only as their competence increases that they comprehend how much they do not know, leading to a dip in their confidence. Our findings in line with available literature comparing self-assessment of competence against external assessment of competence (32,33,65–67). Kairuz *et al* found that pharmacy graduates' self-perceptions of preparedness to practice was higher than the perceptions of their

preceptors (32). The same trend was identified by in an aptly named Canadian study *"I just don't know what I'm supposed to know"*, by Austin *et al* (33). The study compared international pharmacy graduates self-assessment of OSCE performance with the ratings of the same graduates' performance on the OSCE station by trained and experienced pharmacist assessors. The results showed that all graduates rated their performance higher than the ratings given by the trained assessors. Furthermore, the weakest graduates displayed the poorest self-assessment skills. Motycka *et al* highlight that the ability to self-assess is linked to the competence of the health worker, with the most competent individuals rating their competence lower than external assessments and the least competent professionals rating their competence higher than external assessors (65). Lofmark *et al* identified a similar trend, with nursing students in their last week of training rating their own competence more highly than experienced nurses assessment of newly graduated nurses (66). The study also showed that nurses with more years of experience rated the newly graduated nurses' competence lower than the more recently qualified nurses. Interestingly, while Liang *et al* found supervisors assessed nurse competencies significantly lower than self-assessment, they also showed that peer-assessment of practitioners was similar to the self-assessment values and higher than supervisors' assessments (67).

5.1.3. Additional comments on appropriateness of UNAM BPharm curriculum

The majority of the online survey was quantitative; therefore, it was important to give respondents a chance to express opinions on the UNAM BPharm curriculum that they felt had not been covered in previous sections of the survey. Analysis of the 110 different comments received highlighted that while many respondents thought the curriculum is appropriate for the health needs of Namibia, several respondents identified areas where they felt the graduates needed more skills. The most frequently

mentioned areas for improvement were strengthening graduates' business, management and leadership skills (including financial and people skills), calculations skills, pharmaceutics and industrial pharmacy skills, as well as increasing BPharm students' clinical contact time, exposure to dispensing software used in Namibia. These findings are backed up by the findings of the Schools Needs assessment report (59), with similar suggestions being received from the graduate survey, the work supervisors' survey and the stakeholders' consultations. In response to the suggestions and concerns raised in both this study and the needs assessment study, the revised BPharm curriculum has increased emphasis on soft skills including entrepreneurship, management and business skills, as well as additional focus on pharmaceutical calculations, hands on practicals in pharmaceutics and the clinical rotations have dedicated modules assigned to them.

5.2. Analysis of Pharmacy Council Internship Examination Results

Analysis of the professional internship examination results for UNAM BPharm graduates and graduates from all other universities was hampered by the fact that the Pharmacy Council could not retrieve some data as the result of a computer crash. Those records that were received were also not documented in a consistent way, so considerable data cleaning was needed before analysis. Additionally, the method of pharmacy intern assessment changed twice between 2015 and 2020, the planned period of data to be analysed. Consequently, data for Intern assessments in 2015 were omitted and the three types of assessments conducted were analysed separately. The analysis revealed that there was no significant difference in results obtained by interns who had studied pharmacy at UNAM and those who had studied at all other universities, for the calculation and OSCE assessments. Analysis of the legal assessment showed a small but statistically significant difference between the performance of interns trained at

UNAM and other universities, with the UNAM graduates performing slightly better (mean 66.3%, compared to mean 59.2%). This result is not surprising as UNAM graduates are taught the Namibian laws relating to pharmacy in their undergraduate degree, whereas interns who trained outside Namibia would have been taught the pharmacy laws relevant in the country where they studied.

Caution needs to be used in interpreting internship assessment results in relation to relevance of the curriculum, as interns' performance in these assessments will also be influenced considerably by the support and guidance they have received during their internship training.

5.3. Limitations

The major limitation of this study is that, due to outbreak of the COVID-19 pandemic, the planned focus groups were not conducted. They are planned to be carried out at a later date, to feed into the School of Pharmacy's curriculum review but were excluded from the study, due to the risk they posed of increasing transmission of the virus. The envisaged limitation of low response rate, that is common with online questionnaires, was mitigated through active follow up by sending email reminders. The limitation of individual's responses to appropriateness of different modules and competencies of graduates being subjective was minimised by approaching all pharmacists registered in Namibia as well as all UNAM BPharm graduates.

5.4. Summary

The results of this study clearly demonstrate that the current UNAM Bachelor of Pharmacy Honours degree curriculum is appropriate for Namibia's health needs. Furthermore, according to their colleagues, the UNAM BPharm graduates demonstrate internationally accepted competences.

Given the high appropriateness ratings found in this study and supported by graduate and employer/supervisor surveys plus stakeholder engagements, the School of Pharmacy has opted to retain the main elements of all pharmaceutical modules in newly proposed BPharm curriculum. The School discussed the importance of the Veterinary Pharmacy and Agrochemicals module with several stakeholders, in cognisance of this module receiving the lowest appropriateness rating. Given the large proportion of Namibian's who own livestock and the important role that veterinary medicine plays in development of anti-microbial resistance, it was agreed that the topics covered in this module are important for Namibia and should remain part of the curriculum.

Based on feedback from stakeholders in this study and the needs assessment study (59), the revised curriculum has increased emphasis on business, management and entrepreneurship, pharmaceutical calculations and building students' soft skills. The key areas of pharmaceutics and clinical pharmacy have also been strengthened. Additionally, several changes have been made to naming and organisation of modules, to improve flow of topics within the degree and reduce the number of half modules.

The method used in this study was straightforward and has provided essential feedback from stakeholders on the current UNAM BPharm curriculum. This model could easily be used by other Schools and universities training health professionals to assess the appropriateness of their curricula. The method is especially suitable for resource-constrained settings due to the minimal resources required to carry out the assessment; the major resource needed is the researcher's time.

CHAPTER 6. CONCLUSIONS

The aim of this study was to assess the appropriateness of the current UNAM BPharm curriculum to meet the health needs of Namibia. In order to achieve this a cross-sectional survey was conducted of pharmacists registered in Namibia. In the survey pharmacists rated the appropriateness of different UNAM BPharm modules to their current pharmacy practice. Respondents that had experience of working with one or more UNAM BPharm graduates also rated the graduates' competences, based on the FIP Global competency framework (28). Analysis of the Pharmacy Council's intern assessment results was performed to triangulate the data provided by survey respondents' appropriateness ratings for the modules in the curriculum and ratings of the competence of UNAM BPharm graduates.

The response rate from the cross-sectional survey was high with 210 responses out of 610 pharmacists on the Namibia Pharmacy Council Register, representing over a third of the total population. The mean appropriateness rating for all but one of the UNAM BPharm modules assessed was above four out of five, while the mean competence rating for graduates from the programme was 3.3 out of five. The intern assessment results showed UNAM BPharm graduates performed significantly better in the legal examination than interns trained at other universities, but for the other two assessments, calculations and OSCEs there was no significant difference between the two groups of interns.

These results unambiguously demonstrate that the current UNAM BPharm curriculum is appropriate to meet the health needs of Namibia and equips the graduates with internationally accepted competences. This conclusion is supported by findings of the School of Pharmacy's needs assessment study (59) conducted between April and June 2021. Finally, this study has demonstrated a cost-effective model that can be used in

resource-constrained settings to critically assess the appropriateness of health professional curricula to a country's health needs.

CHAPTER 7. RECOMMENDATIONS

The following recommendations are made based on the findings of this study.

7.1. Recommendations to UNAM School of Pharmacy

- Pharmacists in Namibia believe the modules included in the current UNAM BPharm curriculum are appropriate for the health needs of Namibia and this should guide the curriculum transformation process.
- Changes to the current curriculum should be made in order to strengthen BPharm graduates' skills in;
    - business, management and leadership skills (including financial and people management)
    - pharmaceutics and industrial pharmacy
    - pharmaceutical calculations,
- It is further recommended that the new curriculum introduces students to the specific dispensing software commonly used in Namibia and increasing students clinical contact time.
- The School should conduct regular surveys among both its graduates and other key stakeholders, in order to rapidly identify any perceived weaknesses in the curricula of the programmes it runs. This will empower the School to assure that high quality, relevant and appropriate training is being provided to all students to meet the changing health needs of the country.

7.2. Recommendations to the Health Professions Councils of Namibia

- A data base should be created for internship assessments, to ensure consistency of information and to facilitate tracking of interns' progress, reporting and analysis of results.

- Identity numbers, or in the absence of an identity number then date of birth, should be recorded for all interns. This will facilitate identification of interns and prevent confusion between interns with the same surname.
- The data base should also include clear records of exactly what assessment was done on what date, by which intern and the result obtained in the form of both percentage marks and whether it is a pass or not.

7.3. Recommendations for health professions regulators and educators in resource-constrained settings

- Based on the dearth of literature on relevance of pre-service curricula to health needs of a country, compared to the importance of matching training to the local health priorities, it is clear that more emphasis needs to be focused on this topic.
- It is critical that available resources are used optimally in order to maximise health outcomes. Therefore, ministries responsible for health, health professions' regulators and educators should critically review their current health professions' curricula with this in mind.
- The methods used in this study provide a cost-effective model for assessing appropriateness of health professions' pre-service curricula to a country's health needs.
- Conducting stakeholder consultation meetings, as done during the UNAM School of Pharmacy's needs assessment study, provides additional qualitative input to support and strengthen findings from studies conducted using this model.

7.4. Recommendations for further research

- The same methodology can be used at the next curriculum revision to validate the model.
- The UNAM School of Pharmacy should use this model to assess the appropriateness of the other two programmes it runs, namely the Diploma in Pharmacy and Master of Pharmacy (Clinical) programmes.
- UNAM Faculty of Health Sciences and Veterinary Medicine can use this model to assess the appropriateness of other health sciences curricula.
- Other universities that conduct training of health professionals are advised to consider this method to assess the appropriateness of their health sciences curricula to local health needs.
- Once such research has been conducted both within sub-Saharan Africa and globally, comparison of results should be performed.

CHAPTER 8. REFERENCES

1. World Health Organization. Working together for health The World Health Report 2006 [Internet]. Vol. 19, World Health Organization. 2006. Available from: http://apps.who.int/iris/bitstream/10665/43432/1/9241563176_eng.pdf

2. Brock T, Wuliji T, Sagwa E, Mabirizi D. Exploring the Establishment of a Pharmacy Course at the h University of Namibia. 2009.

3. Rennie T, Haoses-Gorases L, Lates J, Mabirizi D, Nyarang'o P, Sagwa E. Sustaining Namibia-Improving the Nation's Health through Sustainable Pharmacy Competency.PDF. Pharm Educ. 2011;27(1).

4. World Health Organization. Transforming and Scaling up health professionals' education and training [Internet]. Vol. 60, WHO offset publication. 2013. Available from: https://apps.who.int/iris/handle/10665/93635

5. World Health Organization. Transforming health workforce education in support of universal health coverage [Internet]. Resolution. 2013. p. 1–3. Available from: http://apps.who.int/gb/ebwha/pdf_files/WHA66/A66_R23-en.pdf

6. WorldCat.org: The World's Largest Library Catalog [Internet]. [cited 2021 Oct 16]. Available from: https://www.worldcat.org/default.jsp

7. Campbell J, Dussault G, Buchan J, Pozo-Martin F, Guerra Arias M, Leone C, et al. A universal truth: No health without a workforce [Internet]. World Health Organization. Geneva: Global Health Workforce Alliance and World Health Organisation; 2013 [cited 2021 Oct 13]. Available from:

http://www.who.int/workforcealliance/knowledge/resources/hrhreport2013/en/

8. Limb M. World will lack 18 million health workers by 2030 without adequate investment, warns UN. BMJ [Internet]. 2016 Sep 22 [cited 2020 Feb 13];354:i5169. Available from: https://www.bmj.com/content/354/bmj.i5169

9. World Health Organization. The African Regional Health Report: The Health of the People [Internet]. WHO. World Health Organization; 2014 [cited 2019 Jul 28]. Available from: https://www.who.int/bulletin/africanhealth/en/

10. Bates I, John C, Bruno A, Fu P, Aliabadi S. An analysis of the global pharmacy workforce capacity. Hum Resour Health [Internet]. 2016;14(1):61. Available from: http://human-resources-health.biomedcentral.com/articles/10.1186/s12960-016-0158-z

11. World Health Organization. National Health Workforce Accounts Data Web portal [Internet]. [cited 2021 Oct 17]. Available from: https://apps.who.int/nhwaportal/Home/Index

12. Rennie T, Nangombe V, Mangombe T, Kibuule D, Hunter CJ. Health workforce planning in Namibia: assessing a pilot workforce survey of pharmacists. Int J Pharm Pract. 2019 Dec 1;27(6):565–74.

13. AlGhurair SA, Simpson SH, Guirguis LM. What elements of the patient–pharmacist relationship are associated with patient satisfaction? Patient Prefer Adherence [Internet]. 2012 [cited 2021 Oct 24];6:663. Available from: /pmc/articles/PMC3461603/

14. Ikhile I, Anderson C, McGrath S, Bridges S. Is the Global Pharmacy Workforce Issue All About Numbers? Am J Pharm Educ [Internet]. 2018 Aug

1 [cited 2021 Oct 24];82(6):635–6. Available from: https://www.ajpe.org/content/82/6/6818

15. Frenk J, Barmes DE. Globalization and Health: The Role of Knowledge in an Interdependent World. 2009;

16. Frenk J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T, et al. Health professionals for a new century: Transforming education to strengthen health systems in an interdependent world. Lancet [Internet]. 2010 Dec 4 [cited 2021 Oct 10];376(9756):1923–58. Available from: http://www.thelancet.com/article/S0140673610618545/fulltext

17. World Health Organization. Global strategy on human resources for health: Workforce 2030 [Internet]. Geneva; 2016. Available from: https://www.who.int/hrh/resources/global_strategy_workforce2030_14_print.pdf?ua=1

18. Ross S, Preston R, Lindemann I. The training for health equity network framework: a pilot study at five health professional schools. Educ Heal. 2014 May 1;27(2):116–26.

19. Pálsdóttir B, Barry J, Bruno A, Barr H, Clithero A, Cobb N, et al. Training for impact: the socio-economic impact of a fit for purpose health workforce on communities. Hum Resour Heal 2016 141 [Internet]. 2016 Aug 15 [cited 2021 Oct 13];14(1):1–9. Available from: https://link.springer.com/articles/10.1186/s12960-016-0143-6

20. Reeve C, Woolley T, Ross SJ, Mohammadi L, Halili S "Ben," Cristobal F, et al. The impact of socially-accountable health professional education: A systematic review of the literature. Med Teach. 2017;39(1):67–73.

21. International Pharmaceutical Federation (FIP). FIP Statement of Policy - Quality Assurance of Pharmacy Education [Internet]. Vol. 1. 2009. Available from: https://www.fip.org/files/fip/PharmacyEducation/FIP QA Policy Statement.pdf

22. International Pharmaceutical Federation (FIP). 2012 FIP Global Pharmacy Workforce Report [Internet]. Workforce Report. 2012. Available from: http://fip.org/files/fip/publications/2009_FIP_Global_Pharmacy_Workforce_Report.pdf

23. Bates I, Bruno A, Arakawa N. 2013 FIPEd Global Education Report [Internet]. International Pharmaceutical Federation. 2013. Available from: https://www.fip.org/static/fipeducation/2013/2013-FIPEd-GlobalEducationReport/index.html

24. International Pharmaceutical Federation (FIP). Global Pharmacy Workforce Intelligence: Trends Report. 2015;1–24. Available from: http://www.fip.org/files/fip/PharmacyEducation/Trends/FIPEd_Trends_report_2015_web_v3.pdf

25. Bates I, John C, Seegobin P, Bruno A. An analysis of the global pharmacy workforce capacity trends from 2006 to 2012. Hum Resour Health [Internet]. 2018 Dec 11 [cited 2019 Jul 28];16(1):3. Available from: https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-018-0267-y

26. International Pharmaceutical Federation (FIP). Nanjing Statements. Statements on Pharmacy and Pharmaceutical Sciences Education [Internet]. 2017. Available from: http://www.fip.org/files/fip/PharmacyEducation/Global_Conference_docs/Na

njing_Statements.pdf

27. International Pharmaceutical Federation (FIP). The Nanjing Declaration: The FIP Vision for Education and Workforce [Internet]. 2016. p. 2. Available from: https://www.fip.org/files/fip/PharmacyEducation/Global_Conference_docs/FIP_global_vision_online_version.pdf

28. FIP Education Initiatives. A Global Competency Framework for Services Provided by Pharmacy Workforce [Internet]. The Hague, Netherlands; 2012. Available from: https://www.fip.org/files/fip/PharmacyEducation/GbCF_v1.pdf

29. International Pharmaceutical Federation (FIP). Transforming Pharmacy and Pharmaceutical Sciences Education in the Context of Workforce Development [Internet]. 2017. Available from: https://fip.org/files/fip/publications/FIPEd_Nanjing_Report_2017_11.10.17.pdf

30. Anderson C, Bates I, Futter B, Gal D, Rouse M, Whitmarsh S. Global Perspectives of Pharmacy Education and Practice. World Med Heal Policy [Internet]. 2010 Jan 30 [cited 2019 Mar 21];2(1):4–17. Available from: http://doi.wiley.com/10.2202/1948-4682.1052

31. Naidoo P, Govender T, Hoosen T, Luchtman Z, Mkhasibe N, Ngcobo N, et al. Identifying perceptions of University of KwaZulu-Natal graduates on the relevance and adequacy of the Pharmacy curriculum to current pharmacy practice. South African Pharm J. 2009;(December).

32. Kairuz T, Noble C, Shaw J. Preceptors, interns, and newly registered pharmacists' perceptions of New Zealand pharmacy graduates' preparedness

to practice. Am J Pharm Educ [Internet]. 2010 Aug 1 [cited 2021 Sep 19];74(6):1–11. Available from: https://www.ajpe.org/content/74/6/108

33. Austin Z, Gregory PAM, Galli M. "I just don't know what I'm supposed to know": Evaluating self-assessment skills of international pharmacy graduates in Canada. Res Soc Adm Pharm. 2008 Jun 1;4(2):115–24.

34. Kruger J, Dunning D. Unskilled and unaware of it: How difficulties in recognizing one's own incompetence lead to inflated self-assessments. J Pers Soc Psychol. 1999;77(6):1121–34.

35. Paraidathathu T, Jamal JA, Azmi N. Preceptor Assessment of the Competencies of Pharmacy Graduates. Procedia - Soc Behav Sci [Internet]. 2011 Jan 1 [cited 2019 May 19];18:134–7. Available from: https://www-sciencedirect-com.ezproxy.unam.edu.na/science/article/pii/S1877042811011335

36. Sealy PI, Williams S, Sa B, Ignacio DN, Extavour RM. Stakeholder perspectives on outcome expectations of pharmacy graduates from a Caribbean school of pharmacy. Am J Pharm Educ. 2013;77(5):99.

37. General Pharmaceutical Council. Standards for the initial education and training of pharmacists. 2021.

38. Yigzaw T, Ayalew F, Kim Y-M, Gelagay M, Dejene D, Gibson H, et al. How well does pre-service education prepare midwives for practice: competence assessment of midwifery students at the point of graduation in Ethiopia. BMC Med Educ [Internet]. 2015 Dec 14 [cited 2019 Aug 4];15(1):130. Available from: http://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-015-0410-6

39. Kibwana S, Woldemariam D, Misganaw A, Teshome M, Akalu L, Kols A, et al. Preparing the health workforce in Ethiopia: A cross-sectional study of competence of anesthesia graduating students. Educ Heal Chang Learn Pract. 2016;29(1):3–9.

40. Mumbo HM, Kinaro JW. Assessment of quality and relevance of curricula development in health training institutions: a case study of Kenya. Hum Resour Heal 2015 131 [Internet]. 2015 Aug 13 [cited 2021 Oct 24];13(1):1–10. Available from: https://human-resources-health.biomedcentral.com/articles/10.1186/s12960-015-0048-9

41. Bruno-Tomé, Hadžiabdić, Mucalo, Rennie. Competency (and Beyond): Think Patient. Collaborate. Develop. Evaluate. Improve. Repeat. Pharmacy. 2019;7(4):146.

42. Katoue MG, Schwinghammer TL. Competency-based education in pharmacy: A review of its development, applications, and challenges. J Eval Clin Pract. 2020 Aug 1;26(4):1114–23.

43. Global Health Workforce Alliance. A universal truth: No health without a workforce. hird Global Forum on Human Resources for Health Global Health Workforce Alliance and World Health Organization. 2013.

44. Gonczi A. Competency-Based Approaches: Linking theory and practice in professional education with particular reference to health education. Educ Philos Theory. 2013;45(12):1290–306.

45. Nash RE, Chalmers L, Brown N, Jackson S, Peterson G. An international review of the use of competency standards in undergraduate pharmacy education. Pharm Educ [Internet]. 2015;15(1):131–41. Available from:

http://www.scopus.com/inward/record.url?eid=2-s2.0-84932639061&partnerID=40&md5=177086572b4b85010fb94c49eaaadcad

46. Koster A, Schalekamp T, Meijerman I. Implementation of Competency-Based Pharmacy Education (CBPE). Pharmacy. 2017;5(4):10.

47. Newble DI, Jaeger K. The effect of assessments and examinations on the learning of medical students. Med Educ [Internet]. 1983 May 1 [cited 2017 Sep 3];17(3):165–71. Available from: http://doi.wiley.com/10.1111/j.1365-2923.1983.tb00657.x

48. Miller G. The assessment of clinical skills/competence/performance. Acad Med. 1990;65(9 Suppl):S63-67.

49. Witheridge A, Ferns G, Scott-Smith W. Revisiting Miller's pyramid in medical education: the gap between traditional assessment and diagnostic reasoning. Int J Med Educ. 2019;10:191–2.

50. Shirwaikar A. Objective structured clinical examination (OSCE) in pharmacy education- A trend. Pharm Pract (Granada). 2015;13(4):1–5.

51. Harden RMG, Downie WW, Stevenson M, Wilson GM. Assessment of Clinical Competence using Objective Structured Examination. Br Med J. 1975 Feb 22;1(5955):447–51.

52. Brown G, Manogue M, Martin M. The validity and reliability of an OSCE in dentistry. Eur J Dent Educ [Internet]. 1999 Aug 1 [cited 2021 Oct 24];3(3):117–25. Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1600-0579.1999.tb00077.x

53. Graham R, Bitzer LAZ, Anderson OR. Reliability and Predictive Validity of a

Comprehensive Preclinical OSCE in Dental Education. J Dent Educ [Internet]. 2013 Feb 1 [cited 2021 Oct 24];77(2):161–7. Available from: https://onlinelibrary.wiley.com/doi/full/10.1002/j.0022-0337.2013.77.2.tb05458.x

54. Setyonugroho W, Kennedy KM, Kropmans TJB. Reliability and validity of OSCE checklists used to assess the communication skills of undergraduate medical students: A systematic review. Patient Educ Couns. 2015 Dec 1;98(12):1482–91.

55. HARDEN RM, GLEESON FA. Assessment of clinical competence using an objective structured clinical examination (OSCE). Med Educ [Internet]. 1979 Jan 1 [cited 2021 Oct 24];13(1):39–54. Available from: https://onlinelibrary.wiley.com/doi/full/10.1111/j.1365-2923.1979.tb00918.x

56. Croft H, Gilligan C, Rasiah R, Levett-Jones T, Schneider J. Current Trends and Opportunities for Competency Assessment in Pharmacy Education–A Literature Review. Pharm 2019, Vol 7, Page 67 [Internet]. 2019 Jun 18 [cited 2021 Oct 24];7(2):67. Available from: https://www.mdpi.com/2226-4787/7/2/67/htm

57. Management Sciences for Health. Development of a Pharmacy Degree Course at the University of Namibia : Competency Framework for a Pharmacist in Namibia. 2010.

58. Manfreda KL, Bosnjak M, Berzelak J, Haas I, Vehovar V. Web Surveys versus other Survey Modes: A Meta-Analysis Comparing Response Rates. Int J Mark Res [Internet]. 2008 Jan 1 [cited 2019 Sep 26];50(1):79–104. Available from:

http://journals.sagepub.com/doi/10.1177/147078530805000107

59. Kibuule D, Hango E, Lates J, Mavu D, Singu B, Kalemeera F, et al. Needs Assessment Report, School of Pharmacy. 2021.

60. Corkhill NL, Lates J, Mubita M, Kibuule D, Jonkman LJ, Hachey D, et al. Creating clinical pharmacy capacity in Namibia: a collaboration to establish a post-graduate pharmacy degree programme. Int J Clin Pharm. 2020;

61. David A. Kolb. Experiential learning: Experience as the source of learning and development. first. Hemel Hempstead: Prentice-Hall International; 1984. 256 p.

62. Dreyfus SE. The five-stage model of adult skill acquisition. Bull Sci Technol Soc. 2004;24(3):177–81.

63. Takase M. The relationship between the levels of nurses' competence and the length of their clinical experience: A tentative model for nursing competence development. J Clin Nurs. 2013;22(9–10):1400–10.

64. Kak N, Burkhalter B, Cooper M. Measuring the competence of healthcare providers. Qual Assur. 2001;2(1):1–28.

65. Motycka CA, Rose RL, Ried LD, Brazeau G. Self-Assessment in pharmacy and health science education and professional practice. Am J Pharm Educ. 2010;74(5):1–7.

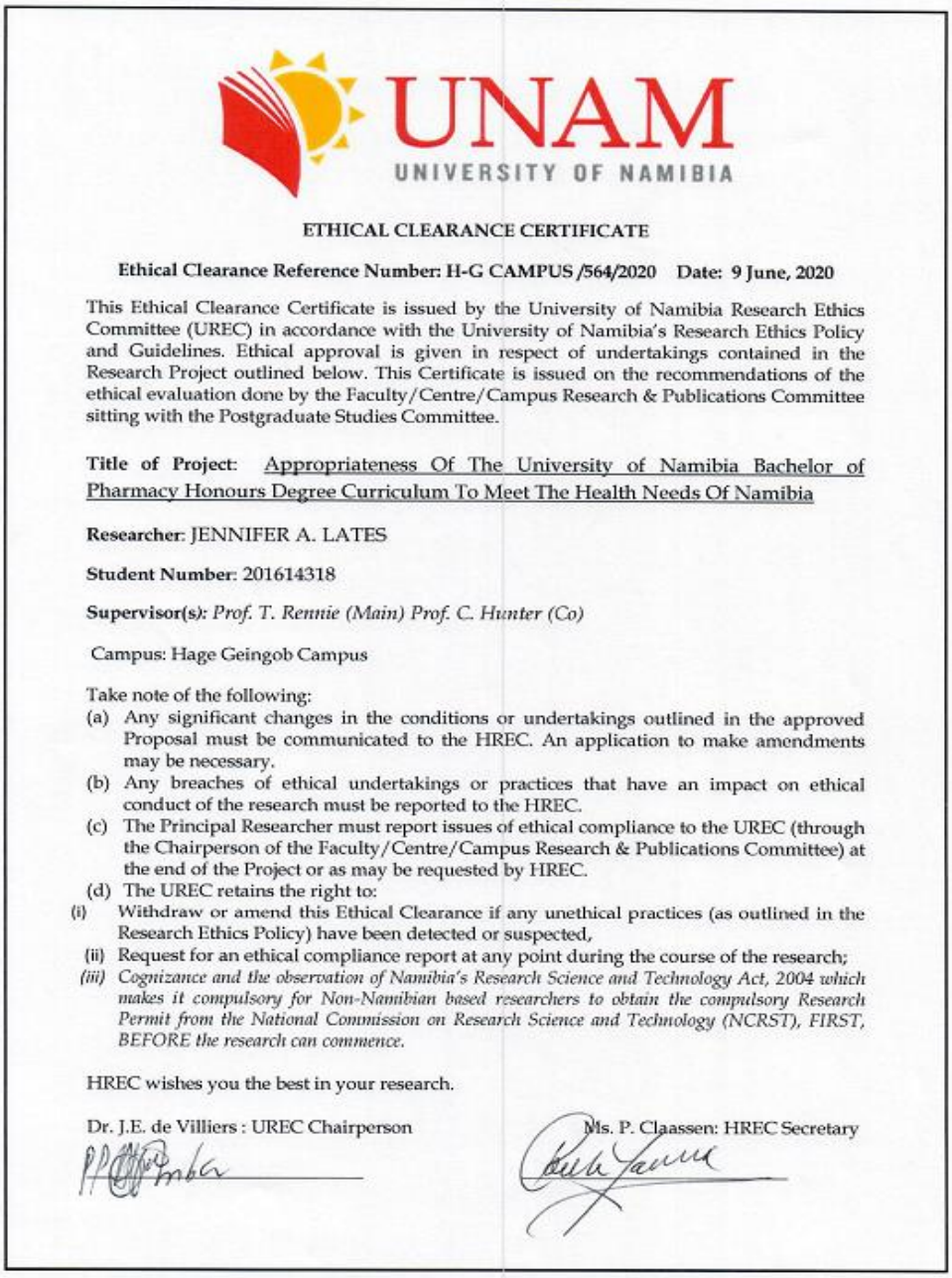
66. Lofmark A, Smide B, Wikblad K. Competence of newly-graduated nurses - A comparison of the perceptions of qualified nurses and students. J Adv Nurs. 2006 Mar;53(6):721–8.

67. Liang HY, Tang FI, Wang TF, Yu S. Evaluation of Nurse Practitioners'

Professional Competence and Comparison of Assessments Using Multiple Methods: Self-Assessment, Peer Assessment, and Supervisor Assessment. Asian Nurs Res (Korean Soc Nurs Sci). 2021 Feb 1;15(1):30–6.

APPENDICES

Appendix A – UNAM Ethical Clearance Certificate



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ETHICAL CLEARANCE CERTIFICATE

Ethical Clearance Reference Number: H-G CAMPUS /564/2020 Date: 9 June, 2020

This Ethical Clearance Certificate is issued by the University of Namibia Research Ethics Committee (UREC) in accordance with the University of Namibia's Research Ethics Policy and Guidelines. Ethical approval is given in respect of undertakings contained in the Research Project outlined below. This Certificate is issued on the recommendations of the ethical evaluation done by the Faculty/Centre/Campus Research & Publications Committee sitting with the Postgraduate Studies Committee.

Title of Project: Appropriateness Of The University of Namibia Bachelor of Pharmacy Honours Degree Curriculum To Meet The Health Needs Of Namibia

Researcher: JENNIFER A. LATES

Student Number: 201614318

Supervisor(s): *Prof. T. Rennie (Main) Prof. C. Hunter (Co)*

Campus: Hage Geingob Campus

Take note of the following:

(a) Any significant changes in the conditions or undertakings outlined in the approved Proposal must be communicated to the HREC. An application to make amendments may be necessary.

(b) Any breaches of ethical undertakings or practices that have an impact on ethical conduct of the research must be reported to the HREC.

(c) The Principal Researcher must report issues of ethical compliance to the UREC (through the Chairperson of the Faculty/Centre/Campus Research & Publications Committee) at the end of the Project or as may be requested by HREC.

(d) The UREC retains the right to:

(i) Withdraw or amend this Ethical Clearance if any unethical practices (as outlined in the Research Ethics Policy) have been detected or suspected,

(ii) Request for an ethical compliance report at any point during the course of the research;

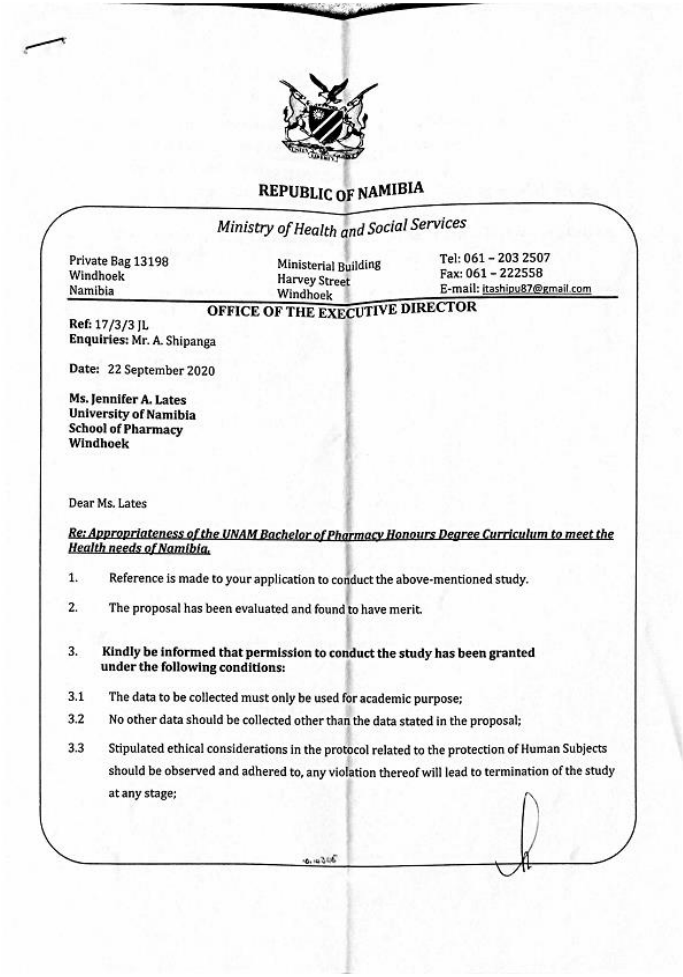
(iii) Cognizance and the observation of Namibia's Research Science and Technology Act, 2004 which makes it compulsory for Non-Namibian based researchers to obtain the compulsory Research Permit from the National Commission on Research Science and Technology (NCRST), FIRST, BEFORE the research can commence.

HREC wishes you the best in your research.

Dr. J.E. de Villiers : UREC Chairperson

Ms. P. Claassen: HREC Secretary

Appendix B - MoHSS Ethical Approval for the study



REPUBLIC OF NAMIBIA

Ministry of Health and Social Services

Private Bag 13198
Windhoek
Namibia

Ministerial Building
Harvey Street
Windhoek

Tel: 061 – 203 2507
Fax: 061 – 222558
E-mail: itashipu87@gmail.com

OFFICE OF THE EXECUTIVE DIRECTOR

Ref: 17/3/3 JL
Enquiries: Mr. A. Shipanga

Date: 22 September 2020

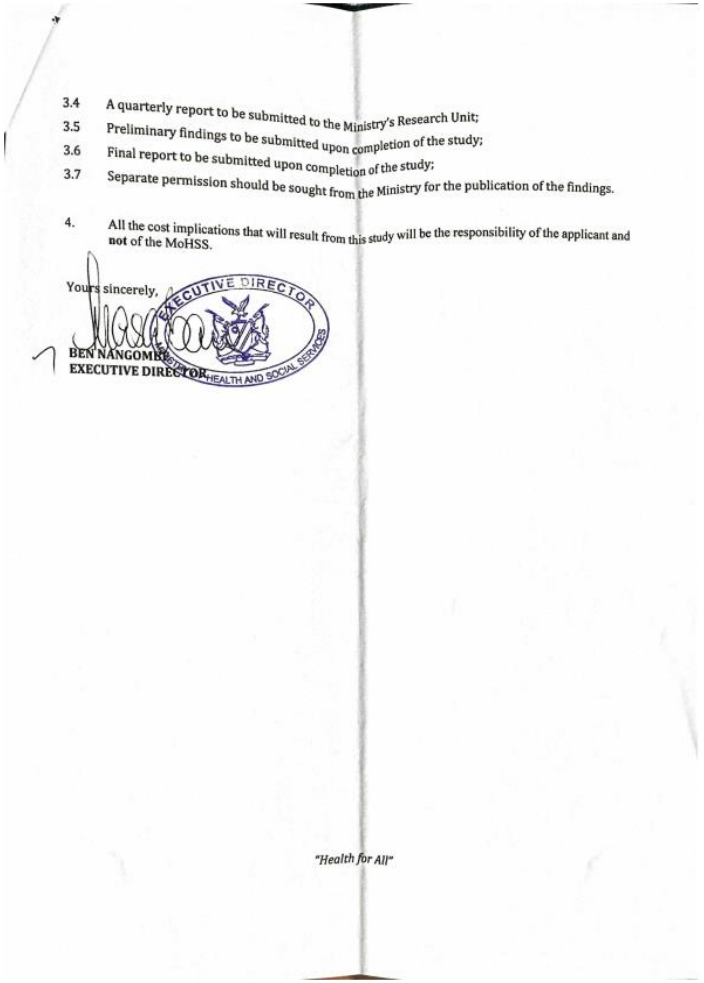
Ms. Jennifer A. Lates
University of Namibia
School of Pharmacy
Windhoek

Dear Ms. Lates

Re: Appropriateness of the UNAM Bachelor of Pharmacy Honours Degree Curriculum to meet the Health needs of Namibia.

1. Reference is made to your application to conduct the above-mentioned study.
2. The proposal has been evaluated and found to have merit.
3. **Kindly be informed that permission to conduct the study has been granted under the following conditions:**

3.1 The data to be collected must only be used for academic purpose;
3.2 No other data should be collected other than the data stated in the proposal;
3.3 Stipulated ethical considerations in the protocol related to the protection of Human Subjects should be observed and adhered to, any violation thereof will lead to termination of the study at any stage;



3.4 A quarterly report to be submitted to the Ministry's Research Unit;
3.5 Preliminary findings to be submitted upon completion of the study;
3.6 Final report to be submitted upon completion of the study;
3.7 Separate permission should be sought from the Ministry for the publication of the findings.

4. All the cost implications that will result from this study will be the responsibility of the applicant and **not** of the MoHSS.

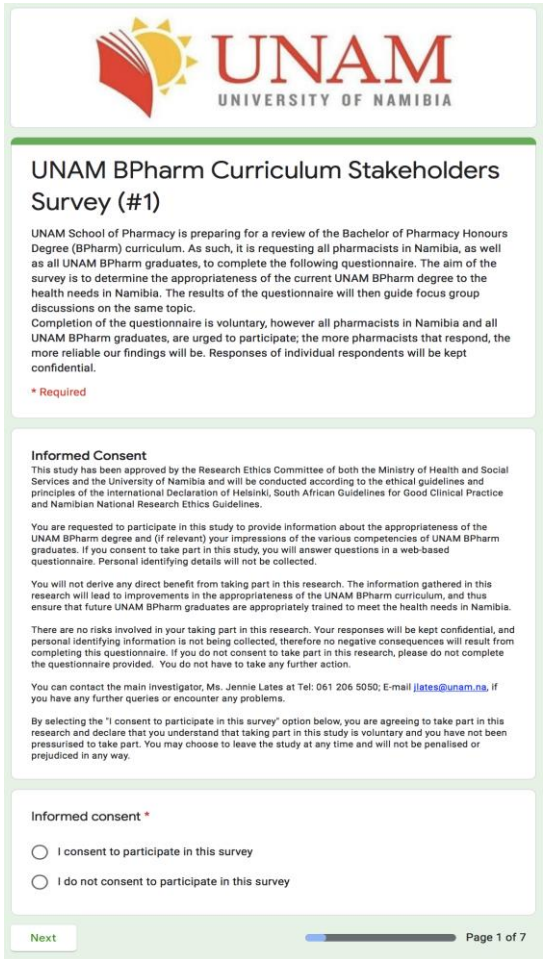
Yours sincerely,

EXECUTIVE DIRECTOR
MINISTRY OF HEALTH AND SOCIAL SERVICES

BEN NANGOMBE
EXECUTIVE DIRECTOR

"Health for All"

Appendix C - Cross-sectional Survey Instrument



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UNAM BPharm Curriculum Stakeholders Survey (#1)

UNAM School of Pharmacy is preparing for a review of the Bachelor of Pharmacy Honours Degree (BPharm) curriculum. As such, it is requesting all pharmacists in Namibia, as well as all UNAM BPharm graduates, to complete the following questionnaire. The aim of the survey is to determine the appropriateness of the current UNAM BPharm degree to the health needs in Namibia. The results of the questionnaire will then guide focus group discussions on the same topic.
Completion of the questionnaire is voluntary, however all pharmacists in Namibia and all UNAM BPharm graduates, are urged to participate; the more pharmacists that respond, the more reliable our findings will be. Responses of individual respondents will be kept confidential.

* Required

Informed Consent

This study has been approved by the Research Ethics Committee of both the Ministry of Health and Social Services and the University of Namibia and will be conducted according to the ethical guidelines and principles of the International Declaration of Helsinki, South African Guidelines for Good Clinical Practice and Namibian National Research Ethics Guidelines.

You are requested to participate in this study to provide information about the appropriateness of the UNAM BPharm degree and (if relevant) your impressions of the various competencies of UNAM BPharm graduates. If you consent to take part in this study, you will answer questions in a web-based questionnaire. Personal identifying details will not be collected.

You will not derive any direct benefit from taking part in this research. The information gathered in this research will lead to improvements in the appropriateness of the UNAM BPharm curriculum, and thus ensure that future UNAM BPharm graduates are appropriately trained to meet the health needs in Namibia.

There are no risks involved in your taking part in this research. Your responses will be kept confidential, and personal identifying information is not being collected, therefore no negative consequences will result from completing this questionnaire. If you do not consent to take part in this research, please do not complete the questionnaire provided. You do not have to take any further action.

You can contact the main investigator, Ms. Jennie Lates at Tel: 061 206 5050; E-mail jlates@unam.na, if you have any further queries or encounter any problems.

By selecting the "I consent to participate in this survey" option below, you are agreeing to take part in this research and declare that you understand that taking part in this study is voluntary and you have not been pressurised to take part. You may choose to leave the study at any time and will not be penalised or prejudiced in any way.

Informed consent *

- ◯ I consent to participate in this survey
- ◯ I do not consent to participate in this survey

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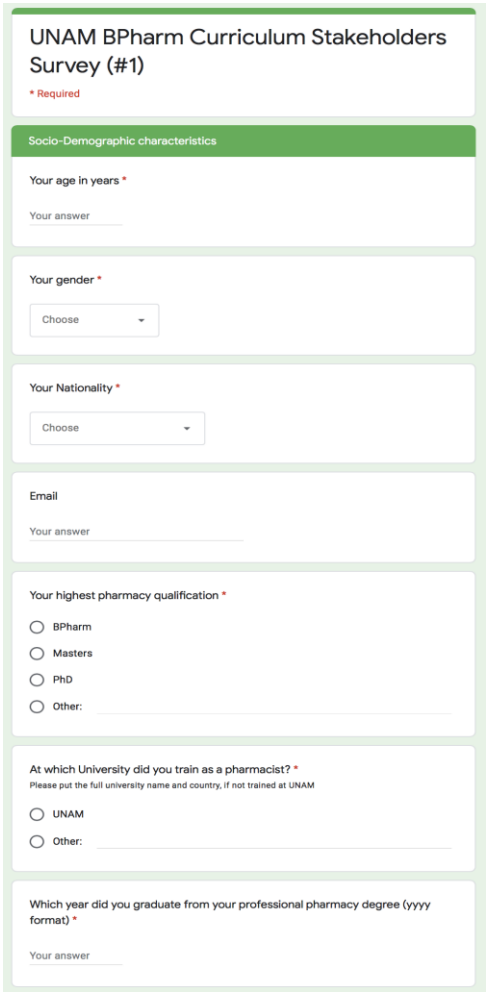


UNAM BPharm Curriculum Stakeholders Survey (#1)

* Required

Socio-Demographic characteristics

Your age in years *

Your answer

Your gender *

Choose

Your Nationality *

Choose

Email

Your answer

Your highest pharmacy qualification *

- ◯ BPharm
- ◯ Masters
- ◯ PhD
- ◯ Other:

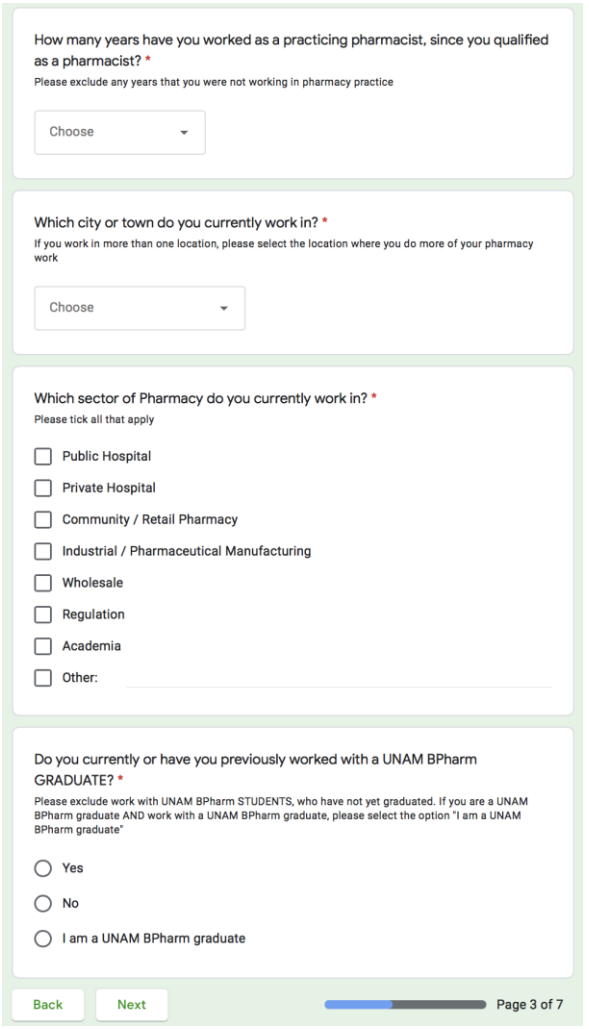
At which University did you train as a pharmacist? *

Please put the full university name and country, if not trained at UNAM

- ◯ UNAM
- ◯ Other:

Which year did you graduate from your professional pharmacy degree (yyyy format) *

Your answer



How many years have you worked as a practicing pharmacist, since you qualified as a pharmacist? *

Please exclude any years that you were not working in pharmacy practice

Choose

Which city or town do you currently work in? *

If you work in more than one location, please select the location where you do more of your pharmacy work

Choose

Which sector of Pharmacy do you currently work in? *

Please tick all that apply

- ☐ Public Hospital
- ☐ Private Hospital
- ☐ Community / Retail Pharmacy
- ☐ Industrial / Pharmaceutical Manufacturing
- ☐ Wholesale
- ☐ Regulation
- ☐ Academia
- ☐ Other:

Do you currently or have you previously worked with a UNAM BPharm GRADUATE? *

Please exclude work with UNAM BPharm STUDENTS, who have not yet graduated. If you are a UNAM BPharm graduate AND work with a UNAM BPharm graduate, please select the option "I am a UNAM BPharm graduate"

- ◯ Yes
- ◯ No
- ◯ I am a UNAM BPharm graduate

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UNAM BPharm Curriculum Stakeholders Survey (#1)

* Required

Working with UNAM BPharm Graduates

Please select in what role/s you have worked with UNAM BPharm graduates (tick all that apply) *

- [ ] I am an Intern tutor of a UNAM BPharm Graduate
- [ ] I previously have been an Intern tutor of a UNAM BPharm Graduate
- [ ] I am the Supervisor or Employer of a UNAM BPharm Graduate
- [ ] I have previously been the Supervisor or Employer of a UNAM BPharm Graduate
- [ ] I work with a UNAM BPharm graduate (not as a supervisor or employer)
- [ ] I have previously worked with a UNAM BPharm graduate (not as a supervisor or employer)

How many years have you worked with any UNAM BPharm graduate, as a tutor, colleague, supervisor or employer? *

Choose

In your opinion, how do the UNAM BPharm graduate/s YOU HAVE WORKED WITH, compare to BPharm graduates from other universities? *

Please consider the graduates' performance as a pharmacist holistically, when responding.

- ○ The UNAM BPharm graduate/s I have worked with is/are weaker than other BPharm graduates
- ○ UNAM BPharm graduate/s I have worked is/are the same level as other BPharm graduates
- ○ UNAM BPharm graduate/s I have worked is/are stronger than other BPharm graduates
- ○ Other:

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UNAM BPharm Curriculum Stakeholders Survey (#1)

* Required

Assessment of UNAM BPharm Graduate Competencies

In this section of the survey, pharmacists are asked to rate the competence of UNAM BPharm Graduate/s that you have worked with, in each of the described areas. The competencies are based on the International Pharmacy Federation's (FIP) Global Competency Framework, 2012.
Please rate the UNAM graduate/s competence in each area from 1-5, where 1 is Not competent at all and 5 is Highly competent. If there is a competency that you are unable to evaluate, please mark the last column, "Unable to evaluate".

1. Domain: Pharmaceutical Public Health *

	1. Not competent at all	2.	3.	4.	5. Highly competent	Unable to evaluate
Assesses primary health care needs, advises on health promotion, disease prevention and control, and healthy living	○	○	○	○	○	○
Counsels population on rational use of medicines and is able to identify sources, retrieve, evaluate, organise and provide relevant medicines information according to the needs of patients	○	○	○	○	○	○

2. Domain: Pharmaceutical Care *

	1. Not competent at all	2.	3.	4.	5. Highly competent	Unable to evaluate
Appropriately selects medicines according to patient and local policies (including for minor ailments). Identifies and acts upon medicine interactionsRow 3	○	○	○	○	○	○
Prepares medicines appropriately (e.g. extemporaneous) including calculations, formulation and procedures	○	○	○	○	○	○
Accurately dispenses medicines as prescribed or for minor ailments, validates prescriptions, labels medicines, documents and acts on dispensing errors	○	○	○	○	○	○
Applies local guidelines and protocols, ensures therapeutic medicines monitoring and identifies and resolves medicines management problems	○	○	○	○	○	○
Appropriately assesses patients' needs, including medication and disease history, discusses and agrees with the patients the appropriate use of medicines, documents interventions and updates relevant records	○	○	○	○	○	○

3. Domain: Organisation and Management *

	1. Not competent at all	2.	3.	4.	5. Highly competent	Unable to evaluate
Effectively sets and applies budgets and ensures financial transparency	○	○	○	○	○	○
Demonstrates effective HR management and people skills, to ensure good pharmacy and multi-disciplinary team work, recognises potential of individuals and facilitates continuing professional development	○	○	○	○	○	○
Ensures availability of most cost-effective, quality medicines from reliable suppliers through accurate quantification, effective store management and record keeping	○	○	○	○	○	○
Addresses day to day management issues, demonstrates ability to take appropriate and timely decisions and ensures work time is planned and managed to optimise provision of pharmaceutical services	○	○	○	○	○	○

4. Domain: Professional and Personal *

	1. Not competent at all	2.	3.	4.	5. Highly competent	Unable to evaluate
Communicates clearly and appropriately with health care staff, patients and carers, demonstrates cultural sensitivity and tailors communications to patients needs	○	○	○	○	○	○
Documents CPD activities, evaluates currency of knowledge and skills, identifies learning needs and acts upon them and reflects on performance	○	○	○	○	○	○
Understands and applies pharmaceutical legislation, adheres to code of ethics, ensures confidentiality and takes responsibility for own actions	○	○	○	○	○	○
Audits quality of service, implements and develops Standard Operating procedures, applies research findings to improve use of medicines and implements	○	○	○	○	○	○
Demonstrates leadership, initiative and efficiency, ensures punctuality, prioritises work and implements innovative ideas	○	○	○	○	○	○

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Self-assessment of competencies

In this section of the survey UNAM BPharm Graduates are requested to self-assess their competence in each of the described areas. The competencies are based on the International Pharmacy Federation's (FIP) Global Competency Framework, 2012.
Please rate your competence in each area from 1-5, where 1 is Not competent at all and 5 is Highly competent.

1. Domain: Pharmaceutical Public Health *

	1. Not competent at all	2.	3.	4.	5. Highly competent
Assesses primary health care needs, advises on health promotion, disease prevention and control, and healthy living	○	○	○	○	○
Counsels population on rational use of medicines and is able to identify sources, retrieve, evaluate, organise and provide relevant medicines information according to the needs of patients	○	○	○	○	○

2. Domain: Pharmaceutical Care *

	1. Not competent at all	2.	3.	4.	5. Highly competent
Appropriately selects medicines according to patient and local policies (including for minor ailments). Identifies and acts upon medicine interactionsRow 3	○	○	○	○	○
Prepares medicines appropriately (e.g. extemporaneous) including calculations, formulation and procedures	○	○	○	○	○
Accurately dispenses medicines as prescribed or for minor ailments, validates prescriptions, labels medicines, documents and acts on dispensing errors	○	○	○	○	○
Applies local guidelines and protocols, ensures therapeutic medicines monitoring and identifies and resolves medicines management problems	○	○	○	○	○
Appropriately assesses patients' needs, including medication and disease history, discusses and agrees with the patients the appropriate use of medicines, documents interventions and updates relevant records	○	○	○	○	○

3. Domain: Organisation and Management *

	1. Not competent at all	2.	3.	4.	5. Highly competent
Effectively sets and applies budgets and ensures financial transparency	○	○	○	○	○
Demonstrates effective HR management and people skills, to ensure good pharmacy and multi-disciplinary team work, recognises potential of individuals and facilitates continuing professional development	○	○	○	○	○
Ensures availability of most cost-effective, quality medicines from reliable suppliers through accurate quantification, effective store management and record keeping	○	○	○	○	○
Addresses day to day management issues, demonstrates ability to take appropriate and timely decisions and ensures work time is planned and managed to optimise provision of pharmaceutical services	○	○	○	○	○

4. Domain: Professional and Personal *

	1. Not competent at all	2.	3.	4.	5. Highly competent
Communicates clearly and appropriately with health care staff, patients and carers, demonstrates cultural sensitivity and tailors communications to patients needs	○	○	○	○	○
Documents CPD activities, evaluates currency of knowledge and skills, identifies learning needs and acts upon them and reflects on performance	○	○	○	○	○
Understands and applies pharmaceutical legislation, adheres to code of ethics, ensures confidentiality and takes responsibility for own actions	○	○	○	○	○
Audits quality of service, implements and develops Standard Operating procedures, applies research findings to improve use of medicines and implements	○	○	○	○	○
Demonstrates leadership, initiative and efficiency, ensures punctuality, prioritises work and implements innovative ideas	○	○	○	○	○

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Appropriateness of Modules

Each survey respondent is being asked to rate the appropriateness of 15 modules of the UNAM BPharm degree. Different respondents will rate different modules, such that when responses are combined all the modules in the programme are rated. Note that foundational science and UNAM core modules have been excluded.

For each module described below please rate how appropriate you think this module is to current pharmacy practice in Namibia, from your perspective. Rate the appropriateness of each module from 1 to 5, where 1 is Not appropriate at all and 5 is Very appropriate.

Applied Pharmaceutical Microbiology *

involves the application of basic microbiological principles in the production of clean and sterile pharmaceutical products in community and hospital pharmacies, and in industrial manufacture. This includes the principles and methods of sterilisation, aspects of disinfection and preservation; concepts of good manufacturing practice, aseptic techniques and infection control in health care settings.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Biostatistics *

provides skills in statistical analysis that are critical for research, evaluation and audit, as well as critical appraisal of the medical literature. It presents a broad approach to evidence based decision making, statistical analysis, and concentrates particularly on areas which are likely to impact on medical care or research.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Community Pharmacy Placement *

provides students with knowledge and hands-on skills in community pharmacy. The module provides students with the opportunity to develop professional skills through interaction with role model professionals and to develop interpersonal communication skills in practice.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Complementary and Alternative Medicine *

equips students with knowledge, skills and attitudes to provide unbiased information and advice to patients on complementary and alternative therapies including African traditional medicine the medicinal uses of various naturally occurring drugs and their history, sources, distribution, methods of cultivation, active constituents, medicinal uses, identification tests, preservation methods, substitutes and adulterants.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

General Pharmaceutics *

builds on the foundation knowledge acquired from the module on the introduction to pharmacy and dispensing. It emphasises on properties of powders and other dosage forms and to do basic calculations related to the physical and chemical properties of drugs and common dosage forms

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Introduction to Clinical Methods and Nursing Skills *

is designed to introduce the students early on to the professional and technical skills, scientific knowledge, and human understanding necessary in the care of the sick, their families, and the community. The module introduces students to basic nursing and providing emergency First Aid resuscitation and support. It emphasizes the health care worker-patient relationships and the process of social communication based on competent use of professional skills.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Introduction to Pharmacology *

highlights the fundamental principles of action of all medicinal drugs. It focuses on pharmacodynamics, pharmacokinetics, and toxicity of drugs used in diagnosis, treatment, and prevention of disease, with emphasis on drugs frequently encountered in clinical practice. Upon completing this unit students will be able to correlate drug effects with physiological function and explain a given drugs mode of action as well as side effects and the mechanisms by with these drugs modify the physiological system.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Medicinal Chemistry I *

covers modern concepts of rational drug design. This includes introduction to Quantitative Structure Activity Relationship (QSAR), combinatorial chemistry, computer aided drug design (CADD), drug metabolism and prodrugs.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Pathophysiology and Pharmacotherapeutics I *

introduces students to the structural changes of tissues and organs of the human body, which result in or from pathological changes, or are caused by excessive functional adaptation or accumulation of the same. The module also introduces students to clinical pharmacy, an increasingly important aspect of modern pharmacy practice. Emphasis will be placed on the integration of knowledge and skills gained from previous courses with pathophysiology and therapeutics to devise appropriate pharmaceutical care plans.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Pathophysiology and Pharmacotherapeutics I *

introduces students to the structural changes of tissues and organs of the human body, which result in or from pathological changes, or are caused by excessive functional adaptation or accumulation of the same. The module also introduces students to clinical pharmacy, an increasingly important aspect of modern pharmacy practice. Emphasis will be placed on the integration of knowledge and skills gained from previous courses with pathophysiology and therapeutics to devise appropriate pharmaceutical care plans.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Pathophysiology and Pharmacotherapeutics II *

enables students to integrate knowledge and skills in pathophysiology and therapeutics to devise appropriate pharmaceutical care plans. It focuses on major body systems including: gastrointestinal, respiratory and cardiovascular; central nervous system; musculoskeletal system; endocrine system and infectious diseases. Students also develop skills in selecting drugs rationally.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Pharmaceutical Technology I *

introduces students to the basics of industrial and small-scale manufacturing. This includes the application of the principles involved in the formulation and evaluation of various pharmaceutical dosage forms, the packaging, labelling and storage of pharmaceuticals and the safe use of tools, equipment and materials during manufacturing.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Pharmacy Law and Ethics *

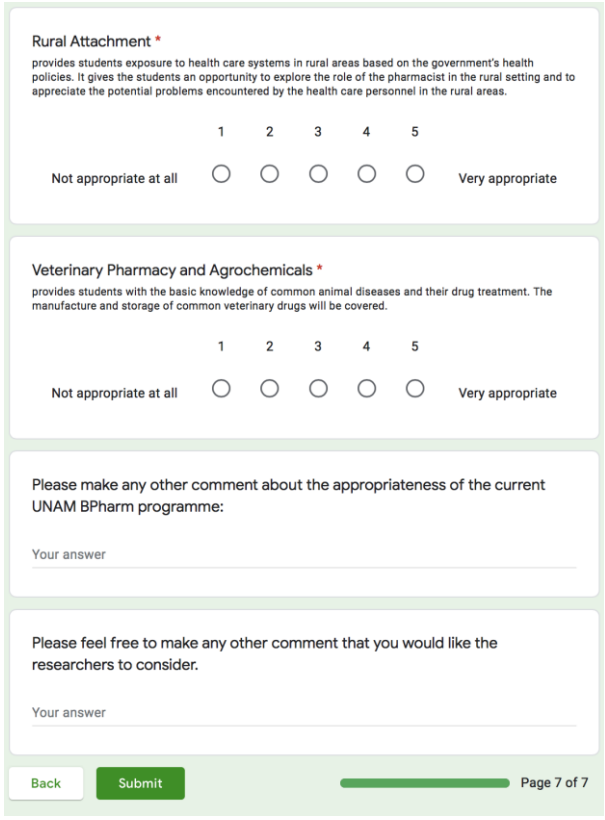
exposes students to several important legislations related to the profession of pharmacy in Namibia. These include the following: Pharmacy Act, Medicine and Related Substances Control Act and Amendment Act; Medical Aid Funds Act; Hospital and Health Facilities Act, Allied Health Professions Act, as well as the National Medicines Policy, Professional Ethics.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate

Pharmacy Management *

aims to develop the foundation for the management of activities in all pharmacy practice settings. These activities include management of operations, financial management, human resources management and marketing.

	1	2	3	4	5	
Not appropriate at all	○	○	○	○	○	Very appropriate


Rural Attachment *
provides students exposure to health care systems in rural areas based on the government's health policies. It gives the students an opportunity to explore the role of the pharmacist in the rural setting and to appreciate the potential problems encountered by the health care personnel in the rural areas.
1 2 3 4 5
Not appropriate at all
Very appropriate
Veterinary Pharmacy and Agrochemicals *
provides students with the basic knowledge of common animal diseases and their drug treatment. The manufacture and storage of common veterinary drugs will be covered.
1 2 3 4 5
Not appropriate at all
Very appropriate
Please make any other comment about the appropriateness of the current UNAM BPharm programme:
Your answer
Please feel free to make any other comment that you would like the researchers to consider.
Your answer
Back
Submit
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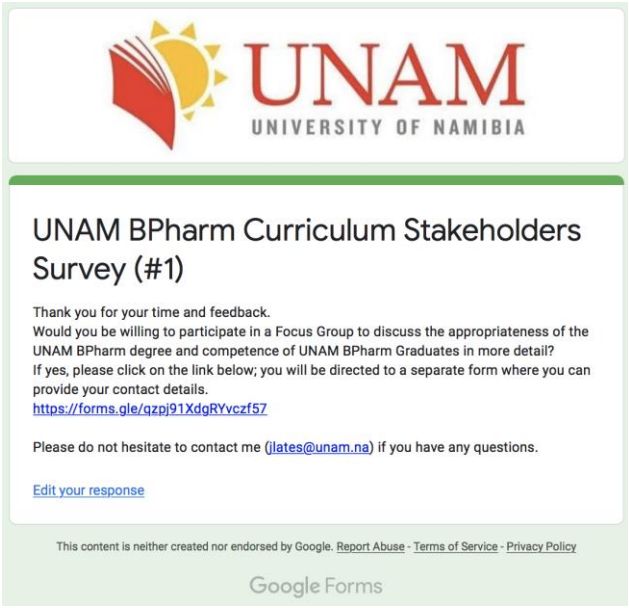
UNAM
UNIVERSITY OF NAMIBIA
UNAM BPharm Curriculum Stakeholders Survey (#1)
Thank you for your time and feedback.
Would you be willing to participate in a Focus Group to discuss the appropriateness of the UNAM BPharm degree and competence of UNAM BPharm Graduates in more detail?
If yes, please click on the link below; you will be directed to a separate form where you can provide your contact details.
https://forms.gle/qzpj91XdgRYvczf57
Please do not hesitate to contact me (jlates@unam.na) if you have any questions.
Edit your response
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Appendix D – Descriptions of all modules assessed in the survey

#	Module Description
1	**Applied Pharmaceutical Microbiology** involves the application of basic microbiological principles in the production of clean and sterile pharmaceutical products in community and hospital pharmacies, and in industrial manufacture. This includes the principles and methods of sterilisation, aspects of disinfection and preservation; concepts of good manufacturing practice, aseptic techniques and infection control in health care settings.
2	**Biopharmaceutics and Pharmacokinetics** provides students with knowledge of drug dosage forms and drug delivery systems and the role of biopharmaceutics in the design of safe and effective medicines. It also provides the students with an understanding of the process and kinetics of absorption, distribution and elimination of drugs and the application of such knowledge to the rational design of dosage regimens and to the *in vivo* evaluation of dosage forms.
3	**Biostatistics** provides skills in statistical analysis that are critical for research, evaluation and audit, as well as critical appraisal of the medical literature. It presents a broad approach to evidence based decision making, statistical analysis, and concentrates particularly on areas which are likely to impact on medical care or research.
4	**Chemotherapy** provides students a basic understanding of the principles of chemotherapy including treatment of infections, infestations and cancer. It includes the rational use of specific drugs, problems of drug resistance, current anti-cancer and anti-infective drugs.
5	**Clinical Pharmacokinetics and Therapeutic Drug Monitoring** develops the students' theoretical concepts acquired in the biopharmaceutics and Pharmacokinetics module. Emphasis is on practical and clinical applications**.**
6	**Clinical Toxicology** covers general toxicology and provides students with knowledge and understanding of basic toxicology relevant for drugs. It covers the most common acute-toxic drugs and chemicals, poisoning symptoms, treatments and antidotes.
7	**Community Pharmacy Placement** provides students with knowledge and hands-on skills in community pharmacy. The module provides students with the opportunity to develop professional skills through interaction with role model professionals and to develop interpersonal communication skills in practice**.**
8	**Complementary and Alternative Medicine** equips students with knowledge, skills and attitudes to provide unbiased information and advice to patients on complementary and alternative therapies including African traditional medicine the medicinal uses of various naturally occurring drugs and their history, sources, distribution, methods of cultivation, active constituents, medicinal uses, identification tests, preservation methods, substitutes and adulterants.
9	**Environmental and Occupational Health** gives students the attitudes, skills and knowledge necessary to provide preventive health services to reduce the health impact of disease and injury resulting from workplace and community factors.

#	Module Description
10	**General Pharmaceutics** builds on the foundation knowledge acquired from the module on the introduction to pharmacy and dispensing. It emphasises on properties of powders and other dosage forms and to do basic calculations related to the physical and chemical properties of drugs and common dosage forms
11	**Hospital Pharmacy Placement** provides students with knowledge and hands-on skills in hospital pharmacy and acts as a stepping stone into the clinical rotations students will do in their fourth year. The module provides students with the opportunity to develop professional skills through interaction with role model professionals and to develop interpersonal communication skills in practice**.**
12	**Industrial/Manufacturing Facility Placement** provides students with knowledge and hands-on skills in the pharmaceutical industry. The module provides students with the opportunity to develop professional skills through interaction with role model professionals and to develop interpersonal communication skills in practice**.**
13	**Introduction to Clinical Methods and Nursing Skills** is designed to introduce the students early on to the professional and technical skills, scientific knowledge, and human understanding necessary in the care of the sick, their families, and the community. The module introduces students to basic nursing and providing emergency First Aid resuscitation and support. It emphasizes the health care worker-patient relationships and the process of social communication based on competent use of professional skills.
14	**Introduction to Pharmacology** highlights the fundamental principles of action of all medicinal drugs. It focuses on pharmacodynamics, pharmacokinetics, and toxicity of drugs used in diagnosis, treatment, and prevention of disease, with emphasis on drugs frequently encountered in clinical practice. Upon completing this unit students will be able to correlate drug effects with physiological function and explain a given drugs mode of action as well as side effects and the mechanisms by with these drugs modify the physiological system.
15	**Introduction to Pharmacy and Dispensing** introduces students to the history and practice of Pharmacy in general and in Namibia. It covers basic skills and knowledge for dispensing medicinal products including the assessment of the validity of a prescription, the use of appropriate reference sources for the interpretation and dispensing of prescriptions. Students are provided with basic skills and knowledge on the application of information and communication technology in pharmacy and dispensing.
16	**Medicinal Chemistry I** covers modern concepts of rational drug design. This includes introduction to Quantitative Structure Activity Relationship (QSAR), combinatorial chemistry, computer aided drug design (CADD), drug metabolism and prodrugs.
17	**Medicinal Chemistry II** covers concepts of biotechnology and the medicinal chemistry of classes of drug molecules. Classes of drugs will be covered in detail with respect to their physico-chemical properties, mode of action, structure-activity relationship, synthesis, chemical, nomenclature, and their side effects.

#	Module Description
18	**Pathophysiology and Pharmacotherapeutics I** introduces students to the structural changes of tissues and organs of the human body, which result in or from pathological changes, or are caused by excessive functional adaptation or accumulation of the same. The module also introduces students to clinical pharmacy, an increasingly important aspect of modern pharmacy practice. Emphasis will be placed on the integration of knowledge and skills gained from previous courses with pathophysiology and therapeutics to devise appropriate pharmaceutical care plans.
19	**Pathophysiology and Pharmacotherapeutics II** enables students to integrate knowledge and skills in pathophysiology and therapeutics to devise appropriate pharmaceutical care plans. It focuses on major body systems including: gastrointestinal, respiratory and cardiovascular; central nervous system; musculoskeletal system; endocrine system and infectious diseases. Students also develop skills in selecting drugs rationally.
20	**Pharmaceutical Analysis** provides students with the theoretical and practical foundation to assure the quality and efficacy of drugs. The module incorporates requirements for drug quality in connection with Good Laboratory Practices and Good Manufacturing Practices. It includes the use of official reference books for drug analysis.
21	**Pharmaceutical Microbiology** covers the various aspects of microorganisms, their classification, morphology, laboratory cultivation identification and maintenance. It includes sterilization of pharmaceutical products, equipment and media. This module covers the classification of organic compounds. It includes the analysis of the chemical and physical properties and the use of organic compounds in pharmacy and medicines.
22	**Pharmaceutical Technology I** introduces students to the basics of industrial and small-scale manufacturing. This includes the application of the principles involved in the formulation and evaluation of various pharmaceutical dosage forms, the packaging, labelling and storage of pharmaceuticals and the safe use of tools, equipment and materials during manufacturing.
23	**Pharmaceutical Technology II** introduces students to the basics of industrial and small-scale manufacturing. This includes the application of the principles involved in analysis and quality assurance as applied to the development, manufacture, assembly and distribution of medicinal products. The module exposes the student to all stages of drug development from discovery of an active agent to launch. The varied components of the undergraduate core course in the context of Industrial Pharmacy and drug development will be consolidated.
24	**Pharmacoepidemiology and Pharmacoeconomics i**ntroduces students to various aspects of pharmacoepidemiology that play important roles in therapeutics, medicine and public health. The module will also introduce students to basic principles of pharmaco-economics and how they are used in the economic evaluation of health care policies and programmes.
25	**Pharmacognosy and Phytochemistry** provides students with knowledge of the medicinal uses of various naturally occurring drugs and their history, sources, distribution, methods of cultivation, active constituents, identification tests, preservation methods, substitutes and adulterants.

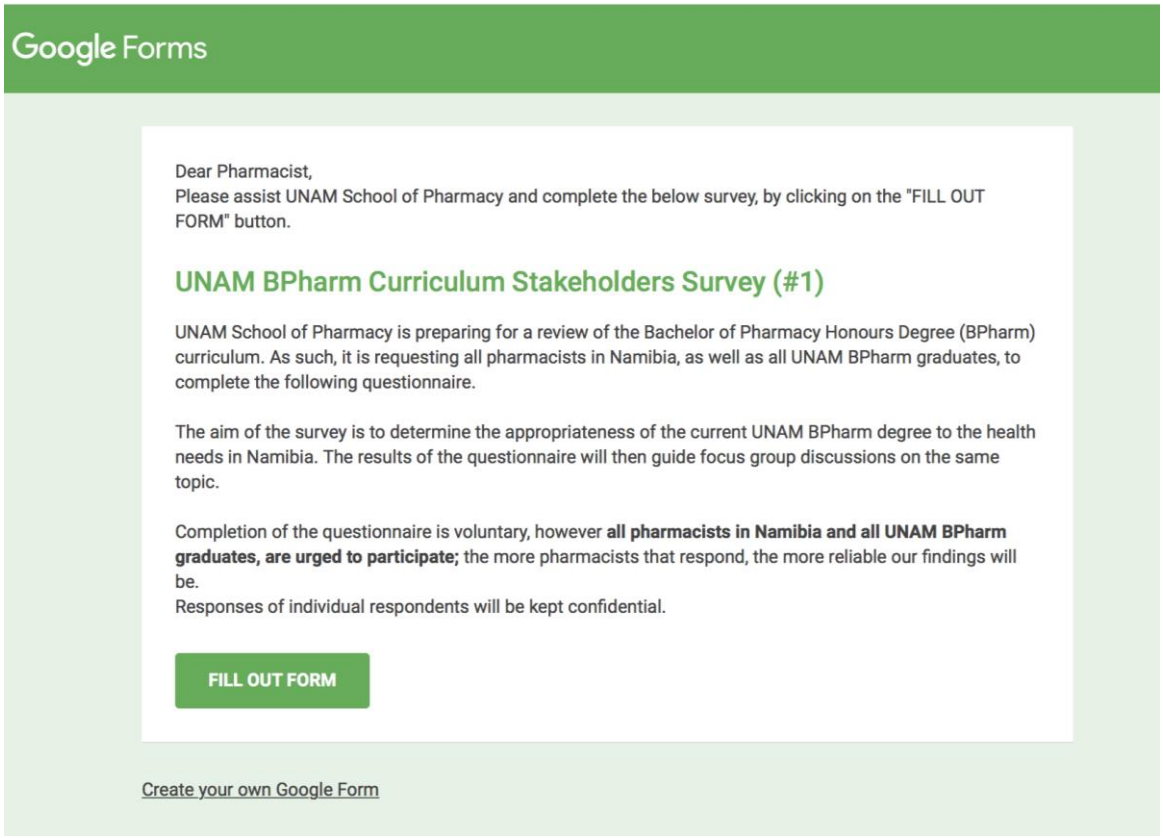
#	Module Description
26	**Pharmacy Law and Ethics** exposes students to several important legislations related to the profession of pharmacy in Namibia. These include the following: Pharmacy Act, Medicine and Related Substances Control Act and Amendment Act; Medical Aid Funds Act; Hospital and Health Facilities Act, Allied Health Professions Act, as well as the National Medicines Policy, Professional Ethics.
27	**Pharmacy Management** aims to develop the foundation for the management of activities in all pharmacy practice settings. These activities include management of operations, financial management, human resources management and marketing.
28	**Pharmacy Practice I** provides students with the skills and knowledge needed in a community pharmacy setting. This includes the provision of pharmacist-initiated therapy, monitoring of patients, responding to minor ailments, counselling, provision of information to patients and the maintenance of all records. The students are introduced to the basics of pharmaceutical business management.
29	**Pharmacy Practice II** focuses on equipping students with the knowledge and skills for managing health commodities and pharmacy personnel within the hospital environment and working in a multi-disciplinary health care team.
30	**Physical Pharmacy** provides students with an understanding of the physical and physicochemical principles, design, formulation, manufacture and evaluation of pharmaceutical dosage forms. It introduces students to concepts such as diffusion and dissolution of drugs, drug solubilisation, surface and interfacial tension, surface active materials, micelle formation and pharmaceutical complexes.
31	**Primary Health Care** introduces students to the principles and importance of Primary Health Care. Students will gain understanding of the social determinants of ill health; Communicable and non-communicable diseases and screening for preventable diseases, as well as learn how to communicate health information and promote healthy living within their communities.
32	**Research Methods** - The student is expected to be able to discern the appropriateness of the method to the problem being investigated, the knowledge base, the resources available, the socio-cultural context, and the level of analysis; recognize that "upstream" primary and secondary prevention is required, especially policy-level interventions designed to affect whole populations; view quantitative and qualitative research methods as complementary partners in the public health research enterprise.
33	**Research Project** intends to develop students' ability to evaluate scientific literature and engage in independent research. Projects will normally be of potential high impact value on health resource utilization and management of diseases relevant to Namibia. In this semester, students will focus more on literature search and research tool development. Data collection, analysis and write-up will be covered in the second semester.
34	**Rural Attachment** provides students exposure to health care systems in rural areas based on the government's health policies. It gives the students an opportunity to explore the role of the pharmacist in the rural setting and to appreciate the potential problems encountered by the health care personnel in the rural areas.

#	Module Description
35	**Systems Pharmacology I** provides students with knowledge on the pharmacology of drugs used in disorders of body systems such as cardiovascular, renal, respiratory, and digestive and peripheral nervous systems. The module develops students' understanding of and skills in experimental pharmacology as a tool in the development of drugs. It develops their ability to conduct experimental investigations in accordance with established standards of scientific procedures and critical thinking.
36	**Systems Pharmacology II** provides students with knowledge on the pharmacology of drugs used in the treatment of conditions of the CNS and in chemotherapy of infections and cancers. It includes and actions for the restoration of physiological functions in the endocrine systems and control of inflammation and immune responses.
37	**Veterinary Pharmacy and Agrochemicals** provides students with the basic knowledge of common animal diseases and their drug treatment. The manufacture and storage of common veterinary drugs will be covered.

Modules not assessed in the survey (* denotes UNAM Core module that all students take)

#	Module Name	#	Module Name	#	Module Name
1	Computer Literacy *	6	Biochemistry I	11	Physical Chemistry
2	Contemporary Social Issues *	7	Biochemistry II	12	Physiology I
3	English for Academic Purposes *	8	Inorganic Chemistry	13	Physiology II
4	Anatomy I	9	Mathematics	14	Physiology III
5	Anatomy II	10	Organic Chemistry	15	Sociology of Health & Disease

Appendix E - Example of survey emails sent to all pharmacists



Google Forms

Dear Pharmacist,
Please assist UNAM School of Pharmacy and complete the below survey, by clicking on the "FILL OUT FORM" button.

UNAM BPharm Curriculum Stakeholders Survey (#1)

UNAM School of Pharmacy is preparing for a review of the Bachelor of Pharmacy Honours Degree (BPharm) curriculum. As such, it is requesting all pharmacists in Namibia, as well as all UNAM BPharm graduates, to complete the following questionnaire.

The aim of the survey is to determine the appropriateness of the current UNAM BPharm degree to the health needs in Namibia. The results of the questionnaire will then guide focus group discussions on the same topic.

Completion of the questionnaire is voluntary, however **all pharmacists in Namibia and all UNAM BPharm graduates, are urged to participate;** the more pharmacists that respond, the more reliable our findings will be.
Responses of individual respondents will be kept confidential.

FILL OUT FORM

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Appendix F - Data coding tool for Pharmacy Council Intern Results

Month	Year	Assessee code	Legal Mark	OSCE mark	Calculation mark	Trained at (UNAM/ Other)

Appendix G – Additional comments made by survey respondents

The table below presents all the comments made by survey respondents verbatim. They are organised by themes they were assigned by the researchers.

#	Additional Comments made by respondents	Theme
1	According to this survey, most of all those modules are very important especially for practicing pharmacy profession in namibia.	Appropriate
2	All modules are appropriate and it depends on which area you are working or you want to further your study in.	Appropriate
3	Appropriate	Appropriate
4	Appropriate. The current modules are very necessary for the Pharmacy training	Appropriate
5	good	Appropriate
6	I am not sure if covered, but herbal exposure and veterinary medicine is a must in Namibia.	Appropriate
7	I feel the program is just adequate with the number of years involved in the training.	Appropriate
8	It is appropriate and applicable to modern practice	Appropriate
9	it is appropriate on the clinical aspects of pharmacy practice	Appropriate
10	It is fine for me	Appropriate
11	its good	Appropriate
12	Keep it up	Appropriate
13	Programme is more than enough appropriate for the students	Appropriate
14	The current BPHARM degree is entirely appropriate and it equips students to practice pharmacy at an advanced level.	Appropriate
15	The curriculum its all encompassing preparing a pharmacist to be a 5 star professional	Appropriate
16	The modules offered by the program are very relevant for the profession. Particularly the different placements, they equipped us with spot on knowledge of how the industry is. So it was very easy to kick off with work after graduation.	Appropriate
17	Very appropriate	Appropriate
18	Very impressed	Appropriate
19	Veterinary Pharmacy is also appropriate	Appropriate
20	Add models / subjects on practice management & leadership and softer skills (non-technical skills) that relate to how a qualified pharmacist work e.g. Problem-solving, effective communication skills, self-direction, attitude drive, adaptability, flexibility, work etics and team work	Enhance
21	Basic Epidemilogy,leadership and management	Enhance
22	Clinical rotations to be made a stand alone module. This is where a student is expected to demonstrate knowledge from all subjects they have been taught in a clinical environment. Four weeks of two to three hours is not enough time to cover the required content.	Enhance

#	Additional Comments made by respondents	Theme
23	Community pharmacy placements are appropriate, but from my point of view, exposure to clinical settings where the students get first hand exposure to management of conditions, drug interactions, managing side effects etc is of outmost importance.	Enhance
24	During my Time as Bpharm Student at Unam we had Little experience on clinical Methods & Nursing Skills, which didn't give us the ability to practice with confidence what we have learnt once we graduated due to lack of more practice during the school time, perhaps if the students are given more attention and time on that module to practice what they learn from that module, it would make the module very much interesting and Appropriate to the Pharmacy Practice specially for those doing Clinical Pharmacy Practice in a Hospital Setting or those who wish to Open a Community Pharmacy to Provide extra Patient Care Services and Screening tests to the community. Kind regards	Enhance
25	Employ more qualified people, Unam is under staffed and thus one lecturer ends up teaching a lot of modules and starts slacking	Enhance
26	I feel the rural placements may be increased to 8 weeks per cycle if possible to give enough time for the desired outcome.	Enhance
27	I hope superior mathematics ands statistics are provided elsewhere. If not they should. But in the First and second year may be.	Enhance
28	I work with students from Zambia, and they actually quiete good from the clinical and practice aspects because they had clinical rotations through out the year, 70% of the days in a work and attended ward rounds everyday.	Enhance
29	I would like to see more emphasis on pharmacotherapeutics and clinical pharmacy including interpretation of blood test results and effects on drug choices/dose variation etc	Enhance
30	I would like to suggest that the current programme also emphasizes on calculations, given that it is a great necessity for a pharmacist and that many struggle with calculations during the HPCNA pharmacist evaluation exams. I would also recommend for the school if pharmacy to incorporate cosmetology in addition to pharmaceutics to the program as some other African countries do. This is beneficial for pharmacists who take interest in manufacturing.	Enhance
31	Include financial management into curriculum. CAM module should include more CAM that are common in Namibia & Africa	Enhance
32	Incorporating Antimicrobial Resistance	Enhance
33	Industrial pharmacy and pharmaceutical warehousing incorporation	Enhance
34	Industrial pharmacy component need to be strengthened. Pharmaceutics module need strengthening	Enhance
35	Introduce Veterinary related placements as well outlining a proper structure that shows a clear integrated approach for one to practice as a veterinary pharmacist.	Enhance
36	Maybe include 'n short course on medical aids. What it is, how it works and problems that a pharmacist may expect when dealing with one.	Enhance
37	Module on management should be improved and made more prominent and less general.	Enhance
38	More practicals expected, especially in industrial pharmacy	Enhance

#	Additional Comments made by respondents	Theme
39	More training the dispensing software used in practice (be it private or state) is a crucial element often left out until internship. Earlier exposure this to would provide an unparalleled advantage for Namibian trained pharmacists in the market place (in comparison to interns from Neighbour omg countries). Additionally this would reduce the pressure of transitioning from university (theoretical knowledge) to the practical application of it in the industries in question .	Enhance
40	most of the graduates I interacted with knowledge of the act and law related to pharmacy was minimal maybe emphasis should be placed on this module. Clinical knowledge of graduates mostly exceeds expectations.	Enhance
41	Much more work is needed in the pharmaceutics modules. With regards to delivering the very basic fundamentals of the modules and organization of the material systematically.	Enhance
42	Offer the graduates a brief orientation in inventory control and management as most of them struggle with this generally perceived "core function of pharmacy"	Enhance
43	other issues example microbiology ,industrial , stock management and pharmaco-economics should get more hours	Enhance
44	Pharmaco-Economics, Business Management	Enhance
45	Pharmacoeconomics, Pharmaceutical Financial literacy	Enhance
46	Please consider teaching pharmaceutical management skills such as LMIS and PMIS reporting,pharmaceutical budgeting and forecasting, FESC, EDT, UNISOLV as these are certainly encountered but graduates have little to no training	Enhance
47	Students knowledge of bioapharmaceticals needs to be enhanced.	Enhance
48	Students need a better knowledge of the laws relating to pharmacy practice in Namibia	Enhance
49	Students should be THOROUGHLY taught about management systems such as PMIS, LMIS, FESC, EDT and dispensing systems such as UNISOLV	Enhance
50	Teach them csk programs for retail use, generic substitute	Enhance
51	The curriculum is quite appropriate but lacks relevance in some areas particularly Computer literacy	Enhance
52	The graduates I have worked with lack basic pharmaceutics and therefore emphasis should be place there. Perhaps additional modules on medicines regulation can be added to give more career options to graduates.	Enhance
53	The majority of pharmacists are employed in the retail sector. By default, they assume positions of leadership - where they are responsible for the management of HR, finances, etc. I strongly recommend the addition of a Business Module (if not already part of the curriculum), which provides basic knowledge on the skills mentioned above and business management.	Enhance

#	Additional Comments made by respondents	Theme
54	The pharmaceutics component is not presented at Unam. If School of pharmacy could look into developing this area, Unam can become a service provider in the future. The laboratories have equipment but its dysfunctional, or not in USE . QC laboratories is suppose to generate income for school of pharmacy. Pharmaceutical Microbiology laboratories is suppose to be service providers. Pharmaceutical Analysis is suppose to be a practical module, but questions and calculations are repeated from the text books. Pharmacy practice modules are suppose to include calculations, practical examples of what truly happens in a pharmacy.	Enhance
55	The pharmacy placement should be longer because when they start as interns, it takes too long for a tutor to make understand that the same pharmacy they learn, is actually what should be put in practice, but once they gain confidence, they excel	Enhance
56	The pharmacy school should consider elongating the rural attachments and hospital attachments from 1 month to 2 or 3, especially in final year as exposure in the field for practical knowledge is very crucial. As a hospital pharmacist, the challenges I faced are knowledge on clinical supplies, these items are controlled by the pharmacist, ordered from suppliers by the pharmacist, hence the pharmacy school should also put more emphasis in that aspect, perhaps providing 1 - 2 weeks attachments in the clinical supplies department. Lastly, admin work as a pharmacist is also very crucial, the pharmacy school should make provision for reports done in hospital pharmacy e.g PMIS, LMIS, ART reports etc, as well as on human resource management, more emphasis should be put on supervisory skills.	Enhance
57	The UNAM BPharm programme has appropriately prepared me to be an effective and competent pharmacist. I am of the opinion that more "science" should be added to the course and less "social science". I find as though the UNAM degree has not adequately trained students in the light of professionalism. Clinically we are excellent, however, the skills necessary to perform professional administration which is often required by pharmacists these days are completely lacking. Most of my colleagues do not present the necessary etiquette, people skills, administrative organization and technological abilities required to be effective or innovative in the broader pharmaceutical industry.	Enhance
58	The world is becoming more and more digital and students should have intensive training on digital skills that are relevant today. Students should have skills to develop software based solutions that are relevant to pharmacy, hence i suggest that a full year computer programming module with focus on web development as well as mobile app development can be a very useful skill for graduates.I believe changes need to be made to the computer literacy module because every enrolling first year usually has some basic computer literacy and instead of repetition it would be wise to expand that skillset into something that is more relevant in today's world.	Enhance
59	to enforce proper calculations for compounding	Enhance
60	Vet Pharmacy and Radiopharmaceuticals	Enhance
61	Veterinary Pharmacy would be very well appropriated for pharmacy practice if more contents was to be covered on that module in a such a way that Students would be able to remember and apply those basic knowledge implemented once the students graduate.	Enhance
62	We need more pharmacology and pharmaceutics modules that need to be spread out evenly across all years.	Enhance
63	when you select students they must have an equivalent of Advanced level pure science in Physics,Chemistry,Biology and Basic applied Mathematics with high scores. some of your students do not even know basic things in Organic chemistry and basic laws such as Dalton Atomic theory. Relativity theory and Newton law of motion.	Enhance

#	Additional Comments made by respondents	Theme
64	Wholesale/ Procurement and Supply Chain	Enhance
65	Work on improving the students'/graduates' to be time sensitive and assist them to value time especially when it comes to patient care.	Enhance
66	4 years program is outdated	Extend
67	5 years instead of 4 years program	Extend
68	Incorporation of other modules and make the corriculum to run for 5 yrs as in many country universities.	Extend
69	Increase training period to 5 years	Extend
70	It should be increased to 5 years for international standards	Extend
71	Most of the pharmacy courses are five years around the world	Extend
72	The curriculum needs to be reviewed to 5years program	Extend
73	Yes increase to 5 years	Extend
74	a slight knowledge of human anatomy is very much helpful in our practice.	Miscellaneous
75	Adequate but not at the standard of South African institutions	Miscellaneous
76	consider area of manufacturing	Miscellaneous
77	Create a committee	Miscellaneous
78	Encourage learners to have public at hart after graduating. To serve the community at large doesn't matter at which side of the country. (Not to be selective)	Miscellaneous
79	engagement with other countries in research especially within the SADC region and tapping skills and knowledge from experienced Pharmacologists, Pharmacognosy experts will propel the future of Namibian Pharmacists into scientists with a passion for advancement of the profession and medicine in general	Miscellaneous
80	focus should not be only community and hospital pharmacy, appeal to HPCNA to broaden the scope of internship	Miscellaneous
81	Full competence is a balance of knowledge, skills and attitude.	Miscellaneous
82	Hi. I do not see any advanced Pharmacology anywhere or am I missing it? This is still the core of Pharmacy and separates us from other Health Care Practitioners. Are these all the Pharmacy-relevant Modules or are there more (except for the basic UNAM modules)?	Miscellaneous
83	I am wondering how your students managed pharmacognosy without doing botany as a stepping stone?	Miscellaneous
84	I have not come across the UNAM curriculum. Above rating is based on level of knowledge i see exhibited by interns i supervise	Miscellaneous
85	I think it will be very helpfull to the UNAM BPARM progremme for the students	Miscellaneous
86	I think pharmacotherapy can replace systems pharmacology.	Miscellaneous
87	i think there should modules on Anatomy, Physiology, biochemistry , pharmacognosy/phytochemistry, pharmaceutucal tech. To combine pharm management & pharmacy practice.	Miscellaneous
88	I would like the pharmacy school to make research on challenges faced by newly graduated pharmacist after internship (less than 1 year of work experience as a pharmacist), it's quite a lot. Thank you.	Miscellaneous

#	Additional Comments made by respondents	Theme
89	I would like to make a strong point regarding national standards of pharmaceutical care. In my opinion, the market for community pharmacists is nearly saturated with the yearly numbers of graduates produced by various Universities. However, I believe there is immense room for pharmaceutical regulation in Namibia. We are speaking about pharmacists who inspect, surveil and report on practicing pharmacists. Too many standards are not met in various aspects of the pharmaceutical industry. The law governing pharmacists is not enforced and the constant rule breaking will lead to the new norm for the industry. This leaves us with a slippery slope that results in the profession as a whole suffering. We need to direct pharmacists to take up the challenge of regulation of the industry. This is to include everything from medicine quality control, therapeutic monitoring, pharmacy inspection and registration. We cannot rely on just training pharmacists and teaching them about ethics and hope they apply that when they come into practice. The pharmaceutical industry is tainted by perverted incentives that continue to exist in various forms and these need to be addressed by the future pharmacy graduates. Without medicines no other aspect of healthcare can function, pharmacy thus remains at the core of healthcare. However, if we cannot transparently show that we can regulate and enforce standards ourselves, then we should not be surprised if non-pharmacists will end up doing it for us.	Miscellaneous
90	In my opinion. The University in collaboration with the MoHSS should initiate a program that orientates new graduates with different reports and paper work that'll be required from them when they become managers; in both private and public sector. Example PMIS reports etc.	Miscellaneous
91	It needs more experienced Tutors/lecturers with vast experience in the proffesion	Miscellaneous
92	It's not enough to look at the appropriateness of the modules. You also need to look at the study guides and lectures. Are the students being taught what they are supposed to be taught? Are the modules covering the content they are supposed to be covering? For example Veterinary Pharmacy is supposed to provide students with general knowledge on common animal diseases and their drug treatment; is that what the students are learning?	Miscellaneous
93	Lecturers should ensure that they have a good background in the modules they teach and appropriately assigned to modules based on expertise and sound knowledge of the modules. Being a pharmacist does not necessarily make one an expert in all areas of pharmacy.	Miscellaneous
94	more on student to be self depended, have research industrial then community based	Miscellaneous
95	Overall very appropriate, but the content covered in some modules is not at the level of expectation. Nonetheless, the modules give one a good foundation on all spheres of pharmacy and for post-graduate studies.	Miscellaneous
96	Pharmaceutical technology and pharmaceutic analysis is the same maybe you can consider naming pharmaceutic 1, 2, 3 and so on instead	Miscellaneous
97	Pharmacy Practice is based on Pharmacology, Pharmacy Practice, Pharmaceutical chemistry and Pharmaceutics however, UNAM B. Pharma (Hons) have to many modules that can be incorporated within the four main Major subjects mentioned above.	Miscellaneous
98	Postgraduate studies Bpharm graduate would want to further in. This is to direct UNAM- School of Pharmacy	Miscellaneous
99	Practical's and lab works are important part of BPharm studies.I didn't see anywhere. If are conducted let be included in the survey.	Miscellaneous
100	Research may focus more on Asthma, Neurological related conditions and Cardiovascular	Miscellaneous
101	Research projects were not mentioned	Miscellaneous
102	Section rated at three reason being that student can easily do post graduates course on those ubject provided that he/she obtained basic knowledge during academic training	Miscellaneous

#	Additional Comments made by respondents	Theme
103	Share the results of your surveys to motivate us to keep filling in these surveys.	Miscellaneous
104	Thanks for the degree	Miscellaneous
105	The modules mentioned above are appropriate for the UNAM BPharm program but the content covered in these modules is not always enough. The content covered in the modules does not always give a true reflection of what the modules stands for.	Miscellaneous
106	The pharmacy profession is a very broad one. However many graduates only end up either in hospital pharmacies and community pharmacies. All stakeholders should find effective ways to be included in the curriculum to sensitize graduates to other crucial areas such as regulation and manufacturing and in the same vein create “space” for these graduates to enter these neglected sectors of pharmacy. As a country we should not preach self sustainability and “growth at home” and not create a platform for such if we will be continuing to import medicines which we have the financial and human capacity for. I say this capacity is there, with vast potential however investment and implementation are greatly lacking/insufficient. We need to pay more attention to this. Thank you for this survey. I trust it will bring much light to the improvements we can all make.	Miscellaneous
107	To align sequencing of the courses over the years of study in a way that allows convenient career path for the Pharmaceutical technicians and the Assistants.	Miscellaneous
108	Totally underutilized facility...no motivation to engage in research	Miscellaneous
109	Work on means to facilitate ethical clearance for clinical research. There has to be a way that the university ethical committee can work with that of the ministry’s including that from NIP	Miscellaneous
110	You focus a lot on cultivating researchers, however they form a very small portion of students.	Miscellaneous