



# Why are we lacking certification standards for Colombia's doctors? An initial approach to describing the problem

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WHY ARE WE LACKING CERTIFICATION STANDARDS FOR COLOMBIA'S  
DOCTORS? AN INITIAL APPROACH TO DESCRIBING THE PROBLEM

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Thesis Submitted to the Faculty of  
The Harvard Medical School in  
Partial Fulfillment of the Requirements for the Degree of  
Master of Medical Sciences in Medical Education

Harvard University  
Boston, Massachusetts.  
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## **Why are we lacking certification standards for Colombia's doctors?**

### **An initial approach to describing the problem**

#### **Abstract**

**Background:** Standardization of medical knowledge is crucial to set minimum standards that can serve as the basis for enhancing high-quality healthcare delivery. Colombia's medical education system lacks regulation, which has contributed to unequitable variation in the quality, knowledge, and skill of students from different medical schools and a general lack of trust towards general practitioners. The aim of this study was to first qualitatively describe stakeholders' perceptions of the need for a national certification process for general practitioners in Colombia and then to quantify these perceptions with a novel survey instrument.

**Methods:** This report uses a mixed-methods exploratory sequential study design, with 9 semi-structured interviews of key stakeholders in Colombia. Attitudes and perceptions qualitatively reported from the interviews and corresponding literature review were used to inform our development of a novel survey instrument that was distributed to doctors in Bogotá, Colombia.

**Results:** Our main qualitative findings from semi-structured interviews revealed that students and faculties wanted a new set of common standards for clinical practice established before an exam was in place and that an accountable entity is needed for supervision of standardization in Colombia. The small sample of respondents to our survey (n=80) were approximately representative of doctors nationally in Colombia (76% GP in the population vs 66.25% in our sample). Our main quantitative findings from the survey revealed that a substantial majority of respondents perceived an exam as beneficial for student training (77%) but simultaneously questioned its acceptance in the clinical field (38%). Lastly, a certification exam was perceived to likely increase general practitioners proficiency, specifically a

pathway to effective delivery of clinical services (76.25%) and a positive change in the perceptions of doctors by patients (46%).

**Conclusion:** A set of educational standards is first needed in Colombia prior to implementation of a standardized, certification exam. Standardization can help address the lack of trust in general practitioners and possibly better link societal expectations and physician performance. Rigorous oversight from a new or existing institution or bureaucracy is of paramount importance to enforce accountability throughout certification process.



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## **Introduction**

The endpoint of medical education is safe and effective healthcare delivery. It can be thought of as a social contract between someone who needs medical care and someone who has been trained by an educational institution, and thus entrusted, to provide it<sup>1</sup>. Society's trust in physicians is earned through a combination of competencies, service orientation, ethical commitment, and accountability that is built during a continuous training process<sup>1</sup>. Effective medical education can directly benefit individuals, families and communities, and indirectly help shape the trust society has in its physicians. Furthermore, health professionals are the link between a patient, knowledge, technology, and treatment; they are caregivers, educators, and leaders<sup>1</sup>.

Standardization of medical knowledge is crucial to set minimum standards that can serve as the basis for enhancing high-quality healthcare. Testing and assessing undergraduate medical programs can help provide assurance that a minimum standard is met for all medical graduates regardless of what institution they attended<sup>2</sup>. In addition, when it comes to healthcare quality, assessment is an important tool for upholding standards.

Colombia's human talent in healthcare is a subject that has lacked attention. Colombia's Ministry of Health is in charge of health professional development and training but the institution responsible for certifying healthcare professionals is the Ministry of Education. As a consequence, medical training programs, graduates' competencies, and social services that universities adopt are autonomous and self-regulated<sup>3</sup>.

This lack of regulation has contributed to substantial variation between medical schools and thus the quality, knowledge, and skill of their graduates <sup>4</sup>. This has eventually led to a generalized mistrust in general practitioners (GPs)<sup>3</sup>. Without minimum standard requirements for what needs to be met by the end of undergraduate medical education, it is difficult to evaluate the quality of healthcare services that patients receive.

Though international standardization strategies, such as USMLE in the United States or AMIR in Spain, exist, the cultural and social context of Colombia needs to be considered to make the standardization process relevant to healthcare delivery within Colombia. This mixed-methods study will be the first approach to describing the problem of lack of standardization for doctors and addresses a potential solution of implementing a nationally standardized certification system.

## **Background**

### **Political and Regulatory Framework of Medical Education in Colombia**

Low- and middle-income countries (LMICs), where constraints in service delivery, policy, and strategic management, amongst others, are abundant, tend to have weak healthcare systems<sup>5</sup>. There are several factors that contribute to the instability of healthcare systems in LMICs. Firstly, beginning in medical schools, the estimated cost of training a medical graduate is approximately \$122,000 USD. Costs of medical education continue to rise and with them, more private medical schools are emerging. In India for example, this issue is of increasing concern regarding their quality, leading to an accreditation reform<sup>5</sup>.

Colombia, like many low and middle-income countries, has a mismatch between medical training and the health needs of the population<sup>1</sup>. One of the key issues is an unequal distribution of physicians across urban and rural regions, with doctors preferring to stay in urban areas. This contributes to unemployment of some physicians in cities and not enough doctors working in underserved rural areas. This mismatch between the health needs of the population and physician workforce contributes to a perceived need for physicians and an increase in the number of medical schools to fill the perceived gap. The lack of standardization with wide variability in the quality of education across medical schools, known as de-Flexnerization therefore results<sup>1</sup>.

Colombia has almost twice as many medical schools per capita as the United States, increasing the variability in training facilities, opportunities, and even skills or knowledge amongst doctors across the country. Currently, there are 64 medical schools registered in Colombia<sup>6</sup>. Out of these 64 institutions, only 34 are certified as high-quality institutions by the national accreditation board<sup>7</sup>. The other non-

certified schools are allowed to operate and keep training doctors. The vast number of unregulated medical schools generates a heterogeneous pool of physicians. This is one of the reasons why there needs to be a way to improve high-quality standards accreditation criteria, as well as implementing rigorous certification processes<sup>3</sup>.

Medical curricula in Colombia are outdated in terms of content and teaching methods. These shortcomings in medical curricula have in part contributed to a healthcare workforce that is not adequately trained to meet the health needs of the population they are serving. A well-designed health system should be able to define the needs of the population and work with medical schools to design a curriculum to meet those needs.

### **Colombian Context**

Colombia is a very diverse country. There are vast differences socially, culturally, and economically between rural and metropolitan regions as well as higher and lower-income areas. Moreover, there are places in the country that have been significantly affected by violence and illegal markets, isolating them from state regulations and assistance. As in many other lower- and middle-income countries, this poses a challenge for public policy implementation as well as effective and equal health care delivery. This may also challenge the medical community in supporting standardization given the diversity of the landscape. Table 1 is a brief example of some of the socioeconomic and health inequalities found nationwide.

*Table 1: Socioeconomic Indicators in Higher and Lower Income Regions in Colombia*

| Health Indicator               | Higher Income Region                   | Lower Income Region                         |
|--------------------------------|----------------------------------------|---------------------------------------------|
| Poverty rate                   | 13.1%                                  | 64% (1)                                     |
| incidence <sup>8</sup>         |                                        |                                             |
| Life expectancy <sup>8,9</sup> | 75.9 years for men and 80.2 for women. | 64.9 for men and 73.6 for women. (1)        |
| Child Mortality <sup>8</sup>   | 13.5 per 1000 children born alive      | 18.5 per every 1000 children born alive (1) |

There is no regulation in training based on regional and national workforce supply and demand.

Standardization in Colombia is made even more complex. This is due to the fact that oversight of medical education is between two different governmental policy spheres, the Ministry of Health and the Ministry of education.

A potential opportunity to address the health needs of the population is through the current makeup of the workforce being comprised mostly of general practitioners. In 2015, the Ministry of Health determined that there were 92,000 doctors in Colombia's health care workforce<sup>3</sup>. Out of these 92,000 doctors, 70,000 were general practitioners (GPs) and 21,000 specialists <sup>4</sup>. The current system fails to utilize GPs to their potential within the system as it stands. Globally, it is estimated that there are 30 doctors and nurses per 10,000 habitants<sup>10</sup>. However, this differs between regions, where high income and metropolitan areas such as Bogotá have 67 doctors and nurses per 10,000 habitats while low-income regions like Chocó have around <sup>4</sup>. It is estimated that 5000 medical students graduate each year, but there are only 1800 openings for specialty training <sup>11</sup>. This implies that more than half of each year's graduates will enter the workforce as general practitioners (GPs) without further training. Standardization of medical education could be a step towards ensuring that this workforce could address the population's need.

To become a GP in Colombia, medical graduates require a certified license granted by the Colombian Medical College with evidence of a university diploma and a social service year certificate. According to how the system is set up, GPs should be able to address 80% of the health concerns of the population. They are said to be the door of entry for patients into the system. The role of the GP is meant to be one of the effective promoters of disease prevention and health promotion while dealing with population health concerns<sup>11</sup>.

Although GPs play a fundamental role in the national health care system, the current model is mostly centered in high complexity level hospitals and specialist care. There has been a change over the last 20 years attributed to a decrease in autonomy during the intern year. This limits GPs' clinical problem-solving capacity which would then lead to a reduction in their competencies. Even though GPs were thought of as being able to address an important percentage of population health issues, GP's work has become an operational task of referring patients to specialists, instead of addressing patient issues directly<sup>4</sup>. Nevertheless, it is clear how GPs are needed for the adequate functioning of the health care system in Colombia, and that they should be able to take care of patients in most circumstances <sup>11</sup>.

With regards to the quality of GPs, concerns have been raised by gremial associations they argue that with their current training, GPs are not able to address most of the health issues that are presented to them by the population, even though this is the role they are expected to fulfill. This, due to limited performance, lack of confidence when managing patients, lack of basic public health knowledge, and deficiencies in team working and communication skills <sup>3</sup>. Despite the fact that there are no studies on GPs' readiness to enter the workforce, it is evident that they lack basic competencies like managing a non-complicated vaginal delivery, basic surgical skills, or even essential clinical knowledge<sup>4</sup>. Without these basic competencies, this leads to a lack of trust by colleagues and patients, turning general practitioners into remission experts.

## **Medical Education in Colombia, a Potential Solution**

According to the National Association of Medical Schools (ASCOFAME), in the Colombian healthcare system, medical education is understood as the lifelong process affected by social and economic structures in which it takes place while linked to the health care system<sup>4</sup>.

Although it is inconsistently applied, there is precedence in Colombia for the idea of standardization. Overseeing entities such as ASCOFAME have been recognized institutions in terms of high-quality medical education and innovation, however, medical school participation in these institutions is voluntary. These agencies have suggested future improvements nationwide, for example a set of national competencies, a predetermined medical graduate profile, and the implementation of a national exam to verify if graduates are meeting national competencies and can apply their knowledge in the clinical setting<sup>3</sup>. However, a thorough analysis of how this process would take place in a Colombian context is still lacking.

The chronic lack of supervision by educational entities has created a pool of vastly unequal distribution of GPs, concerning knowledge, skills, and competencies. Social changes over the past 20 years have also decreased clinical exposure which had proven to be highly necessary for GPs' training since GPs' tend to have less confidence<sup>4</sup>. In addition, the system has set them aside since it is based on highly specialized care. All of the above, have caused an important mistrust in GPs preventing them from playing the important role they initially had.

Currently, all university graduates (medical and non-medical) have to take a government standardized general exam during their last year of higher education, Saber Pro. Students who have earned more than 75% of their total degree credits are eligible to take the exam. The goal of this exam is to “prove

competency development in students, generate indicators of aggregate value, and collect data for future indicators on the program and institutional evaluation”<sup>12</sup>. Saber Pro exam is divided into two parts, part one evaluates critical reading, quantitative reasoning, citizen competencies, written communication, and English. The second part is focused on each student’s discipline. The exam has both multiple-choice and open-ended essay questions. It is a low-stakes exam since test takers are not required to pass the test to graduate. However, one of the items in the national program ranking is the average Saber Pro score. With regards to the medical field, exam scores have no impact on the graduating doctor’s future.

In addition, the National Medical School Association (Ascofame) has designed and implemented a multiple-choice medical knowledge test that evaluates last year's medical student knowledge. This is a high-stakes exam since the results add up to other factors that determine which of the participants is the “best intern” in the country. Besides the social and academic recognition, there is a financial reward for winning this prize. However, the exam is voluntary and has no impact on test-takers' academic future<sup>4</sup>.

### **Setting Standards to Fortify the Social Contract Between Medical Education and Society**

The medical profession is seen as a social-based activity, with established characteristics and regulations<sup>13</sup>. This is a two-way relationship in which society determines resources while the profession controls standards and how social expectations are met. Likewise, society expects doctors to “provide services of a healer who is competent, moral and accountable”<sup>13</sup>. Medical education’s social contract is unwritten and implicit. It is a traditional social phenomenon based on expectations from each side.

Shortly after the Flexner revolution, an implicit social contract emerged between universities and society. Medical schools would train doctors that the people needed and in return, society would provide the resources they required to carry out research and education<sup>14</sup>. Part of this social contract implies giving

patients the best quality of care through properly trained doctors. In the earlier twentieth century, state licensing laws were established in the United States. This drove inferior schools out of business. Back in the day, many argued that this law was not only for physician protection and status elevation but rather a benefit to society since it would protect them from “unqualified, ignorant and dishonest practitioners”<sup>14</sup>. This is an example of how standards setting in medical education led to a stronger bond between them a society.

To strengthen this historical contract between society and medical schools, accreditation appeared<sup>15,16</sup>. This is a process by which institutions are assessed on predetermined standards by peers or external bodies to “ensure an acceptable quality of graduates to meet the health needs of patients and populations”<sup>1</sup>. As expected, accreditation varies greatly across nations and continents, and gaps in accreditation and credentials are a worldwide issue<sup>17</sup>. Ideally, accreditation should promote professionalism in the educational field, which is trusted by society, while representing the aspiration of professionals<sup>1</sup>. Liking accreditation to the social contract of medical schools, a new term emerges - social accountability. According to the World Health Organization, social accountability of accreditation is “directing education, research and service activities towards addressing the priority health concerns of the community, region and/or nation they have the mandate to serve”<sup>18</sup>. Medical education’s social accountability has the potential to produce a well-distributed, capable workforce. But as Frenk states, “not all institutions have been established for social accountability”<sup>1</sup>.

### **The Role of Testing in Standardization**

One of the many roads to setting standards in medicine is through standardized testing. They are thought of as professional tests that applicants need to take in order to demonstrate that they have learned enough to perform their job<sup>19</sup>.

Testing usually has a formative or summative purpose. The design, reports, and inferences that can be made from a test will vary depending on what purpose it has<sup>20</sup>. On the summative side, an evaluation takes place at the end of a specific term to assess the final product. Not surprisingly, these kinds of assessments are frequently used for accountability. With regards to medical education, assessment is vastly useful for students, faculties, and patients. “It drives and stimulates learning, provides information on educational efficacy to institutions and teachers, and protects patients”<sup>2</sup>. It is not a surprise that most countries in the world use summative, standardized high-stakes examinations for these purposes.

Testing, however, is not as simple as exposing a group of students to an exam. Rather, it should be thought of as a process. Previous notice of what is expected from students for them to prepare effectively and demonstrate their knowledge in the test is needed. Also, structured feedback on their examination and scores is useful for them to learn from this experience and help them progress<sup>2</sup>.

In addition, an examination can be divided into high stakes and low stakes tests. A low-stakes examination has no or minimal repercussions for the test taker, while a high-stakes examination has significant consequences<sup>21</sup>. In medical education, standardized exams are mostly high-stakes assessments for students in which their future career opportunities will heavily depend on scores.

Further, standardization means all test takers face the same tasks, the exam is administered and scored in the same way. This is an advantage when taking into account that medical education is variable, students train in diverse facilities and with different curricula. But population needs are mostly the same when limited to a region or country. One of the advantages of standardization is that provides comparable information.<sup>21</sup>

The final product of medical education is healthcare delivery, this is why patients and society should encourage testing and assessment programs for doctors, “they provide assurance that graduates have met

minimum standards and are “fit for purpose”<sup>2</sup>. In addition, when it comes to healthcare quality, assessment is an important tool for upholding standards and keeping the implicit contract between medical education a society alive.

## **Problem and Justification**

The lack of supervision by higher institutions over Colombia's education system has created a heterogeneous workforce with no common competencies that have eventually led to a breakdown in trust towards GPs. This has also caused a disconnection between society's expectations and physicians' performance, leading to a phenomenon in which education is independent of the system, social context and needs of patients.

As it happens, regulation of the education system through common competencies fomented by a standardized certification strategy for GPs is one of the many roads to addressing the lack of trust towards them and the dissociation between needs and performance. By setting common curricular standards or graduation requirements, doctors' competencies would be more homogeneous, eventually leading to standardized healthcare delivery<sup>22</sup>. Likewise, a certification system would be accountable for physicians' training and educational outcome, strengthening the implicit contract between physicians and society.

Literature has also shown how accreditation systems and standard-setting are a way of assuring society that physicians who are being trained are competent to take care of a population<sup>1</sup>. In addition, competency standardization by assessments has also proven desired by societies.

As this background highlights, there needs to be a change in culture in order to address the breakdown of trust between physicians and the people they are serving and physicians and the standardization process. This study makes a modest, yet important contribution in the direction of shifting culture by identifying what some stakeholders think about standardization and by providing suggestions for next steps in moving closer to the culture change that will be required to accept the standardization. This study explores how setting standards is perceived by stakeholders in Colombia. By setting standards, common competencies for students undergoing medical training would be developed. The country has an

opportunity to build a set of educational guidelines based on twenty first century health problems, strengthening the link between education and health delivery. However, the social context must be explored. This is an initial approach to describing the needs, acceptance, and process of standardization in a Colombian context.

## Methods

### General Design

This study was a mixed-methods exploratory sequential design following the AMEE guide No. 87, *Developing a Questionnaire for Educational Research*<sup>23</sup>. First, a literature review was carried out to determine a survey construct and a potential list of survey items. Second, a qualitative study with interviews with stakeholders was designed and conducted. Qualitative data was collected, analyzed, and synthesized with the literature review to build a framework that will inform the items of a quantitative survey. After expert validation, cognitive interviews, and pilot testing, this survey was distributed to a cross-section of physicians in Bogotá, Colombia. Quantitative data was collected from the survey, analyzed, and presented. Figure 1 is a schematic representation of the mixed-methods approach.

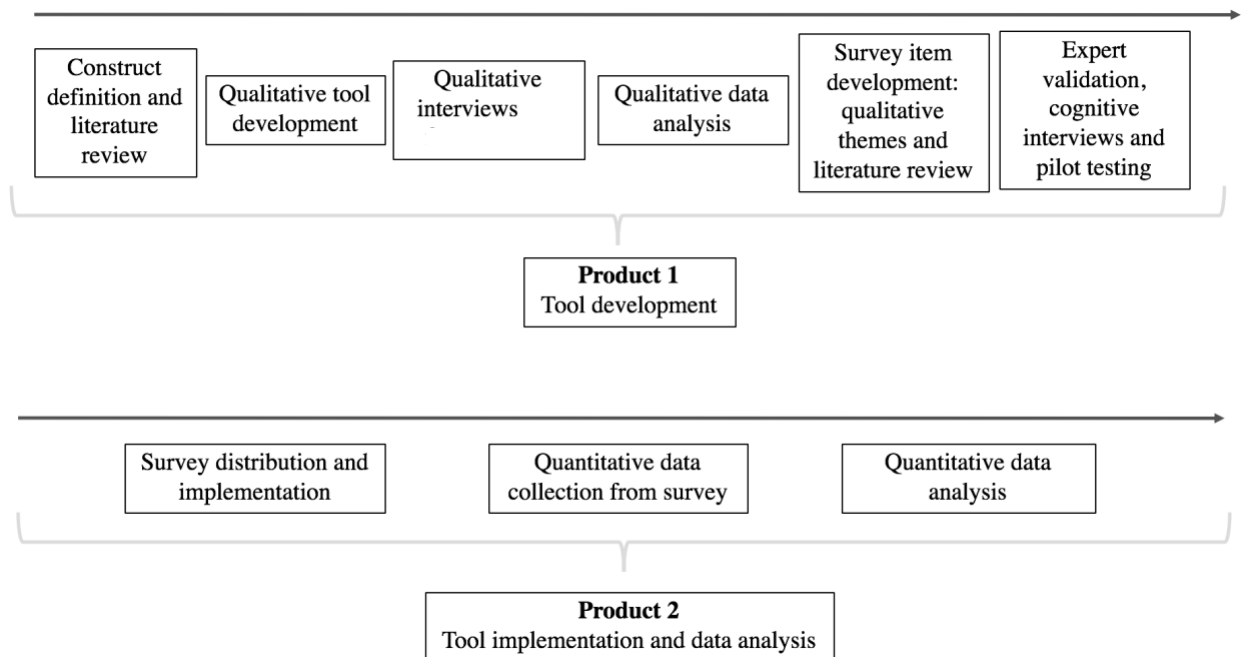


Figure 1: Mixed-methods diagram

## **General Research Question**

Amongst key stakeholders in Colombia's healthcare system, what are the perceptions of introducing a nationally standardized certification process to become a general practitioner?

## **Specific Research Questions**

- What are the facilitators and barriers to establishing a standardized certification process for general practitioners in Colombia?
- What are key stakeholders' perceptions of the benefits of a potential certification process in Colombia and its effects on society?
- What is the general perception of doctors across the country on a potential certification process for general practitioners, its acceptance, and its effects on the society?
- Are there statistically significant differences between doctors' age groups, gender and type of training when answering perception of the need, acceptance and impact of a certification process for GPs in Colombia?

## **Study Aims**

- To describe medical educators, heads of department, deans and general practitioners' perceptions of the need for a national certification process for general practitioners in Colombia.
- To create an instrument that will measure doctors' perspectives on the need and impact of a certification process for general practitioners in Colombia.
- To apply a survey that will measure doctors' perspectives on the need, acceptance, and impact of a certification process for general practitioners in Colombia.

## **Ethics Approval**

This project was approved by Harvard Medical School Institution Review Board on 7/9/2020. Protocol number: IRB20-1149. This project was exempt.

## **Qualitative Study Design**

The design was a phenomenological study using semi-structured interviews to explore stakeholders' perceptions of the need for a national medical knowledge exam for the doctor's certification process in Colombia. Traditional grounded theory helps generate a conceptual framework that is relevant for a specific problem. The COREQ checklist <sup>24</sup> (*Appendix A*) was used as a tool for qualitative methodology to address rigor during methodological design. This checklist exhibits the items that should be included in a qualitative report. The checklist was used to assure rigor during the qualitative phase of the study.

## **Population**

A purposeful sampling to involve stakeholders in Colombia's medical education with different backgrounds was carried out to assure a wider perspective on this matter. A list of potential participants was designed by the main investigator and the context expert. It included four groups: medical educators and deans, government officials, general practitioners, and hospital leaders. Three individuals from each group were invited to participate. A total of 12 participants were contacted via email backed up by national context expert, Dr. N. Mejia. Nine interviews were conducted via zoom using a semi-structured interview guide (*Appendix B*). Interviewees were three medical directors at hospitals in different regions of the country, two senior medical educators in Bogotá, two general practitioners, one who had been for five years in this role, and another one who had been 6 months in this job. One specialist trained overseas, and one public policy expert. Participation was voluntary and verbally informed consent was obtained at

the beginning of each interview. There were three participants from the government officials' group who were approached by the research team and denied participating in the study.

### **Data Collection and Analysis**

Interviews were carried out in Spanish by the main investigator, recorded via zoom, and transcribed into Spanish by the same investigator. Recordings were kept in an online location with a password known only to the main investigator. After transcription, interviews were uploaded to the software *Dedoose*. A codebook was developed by two investigators, IV and DH who were familiar with open coding technique and proficient in English and Spanish. A total of 37 codes were produced in Spanish (*Appendix C*). The codebook was piloted by applying it to three interviews. No new codes were needed and developed codes fitted with the data. Then open coding was carried out by the main investigator. Codes and quotes were translated by the main investigator and a random sample of three of them was revised by a peer with experience in research who is fluent in both English and Spanish. Thematic analysis was used to identify central categories using to generate a new theory on perception for the need to add a nationally standardized certification process. Level one categories were developed. Twenty-one level one categories were developed and used as the main concepts that provided bases for an explanation. By linking and framing categories, four level two categories were built.

## **Qualitative Results**

### **Theme one: Understanding Realities of Medical Education**

The steps that should be taken in order to develop a certification process for general practitioners in Colombia are described below as well as the aspects that should be taken into account for such.

### **Certification beyond examination**

Participants address the fact that a unique standardized exam is not enough for a national certification process. They argue that power should be distributed when it comes to assessing a student and that the process should be well-grounded and balanced.

**Representative quote:**

*"[...] it seems to me that the exam is just a sophism to distract you because just to give some much power to an exam... I'd like it to take into account the grades, let's say the students' performance grades. Each one gets their grades and what their performance has been, that ought to count, it should count what their performance is during their undergraduate term in the different subjects, a general knowledge exam should count, a structured clinical exam should count, that shows how they solve clinical situations. But there should also be mixed in some public health issues, how they manage to solve this type of things, I'd also love it that there'd be a portfolio." 2*

**Medical education at al limbo**

Accountability for untrained or not-proficient doctors is a cycle of negligence from medical schools and the state. A student who finishes medical school and obtains a medical degree backed up by a medical school should be able to prove his or her abilities as a general practitioner.

**Representative Quote:**

*"[...] it's a failure of the whole system, both of the medical schools that trained them and, secondly, of the state that did not supervise that those medical schools meet the minimum standards to educate that person. That they are teaching them a subject that requires an agreement with a hospital, then you cannot teach surgery to a general practitioner, you cannot educate them under surgical conditions if that person doesn't have access to an operating room or specialists who may be able to teach them. And there's got to be some sort of control, and once again the problem with medical education is that too much is left up there in the clouds between the Ministry of Education and the Ministry of Health. But neither of them understands the specifics of medical education." 3*

### **Dishonesty leading to a non-prestigious exam**

Participants believed that high stakes examinations should be prestigious and rigorous in order to have strong and valid results. Students might look for shortcuts in order to avoid being exposed to an assessment that could determine if they can work as general practitioners or not.

#### **Representative Quote:**

*“[...] I believe that the negative side’s unfortunately, it’s inherent in our country, corruption; that exams are being sold, that questions are filtered out, that they start buying them... even that would be a negative phenomenon. Then people would not be preparing in an honest way, but they’d be looking for this sort of shortcuts to achieve it, for example. That’s called a cutoff, that such an exam didn’t have any prestige, that it wasn’t a matter of pride to take it and pass it, but that it was just a requirement, and a secondary one at that.” 9*

### **Unpaid time**

A certification process that includes something extra to the regular medical training after 6 years of medical school would imply that students would need extracurricular time for preparing an exam. A vast number of medical students rely on immediate general practitioner income to pay for school loans. Preparation time for the exam would be unpaid.

#### **Representative Quote**

*“[...] the delayed graduation process and the title awarded to those who haven’t really got an adequate education aimed at the objectives set by the certification, increases professional’s loss of probable profit... that they invest more time in the preparation of the certificate exams which are not included in the internship and rural year, when you aren’t paid.” 4*

### **Theme Two: Variety Among Faculties**

The development of a new requisite for obtaining a medical license should involve all medical schools in the country, given the social and cultural context of Colombia. Representative quotes and themes below depict how a certification process should be created without leaving faculty behind and the potential benefits it could have for them.

### **Involvement of faculty**

Participants acknowledged that an effective certification process should include all medical schools in the country since population needs vary widely among regions. If an exam were to be considered, faculty should feel included.

### **Representative Quote:**

*"[...] Collaboration; what's the core, what are the resources, where are they going, and you know how it's done so that it's in a collaborative way, it seems to me that it's important that all University institutions feel they have a chair or a space in this process because, it deals with social, cultural, ethnic needs, whatever it is in each of the country's regions." 2*

### **Closing the gap between universities**

A high-stake standardized exam could be used as a tool in which students demand a better quality of education and faculties can compare to other types of education and curricula and to themselves at different points of time. This is said in a substantially different economical and academic context.

### **Representative Quote**

*"[...] I can't give you the name of faculties, but I do know that in the country we've got very poor faculties regarding the education processes, even faculties in smaller cities that do not have a university hospital nor have they got contact at a level that one may say it can ensure that this young professional is getting [a] good education, then a standardized exam somehow is going to press the universities and the students so they can demand efforts from each other." 5*

## **Desired Differences**

Participants said that having a standardized group of medical schools is not beneficial or logical in any setting. They agree that some variability between medical schools is needed, however, basic standards for all should be respected.

## **Representative Quote**

*“[...] then each University does what it can, and we’ve got a mixture of physicians with different education levels, but way too much too much heterogenicity, the goal is not for all to be the same because there’s got to be some difference between faculties, but the proposal had been that 60% or 70% of the core was similar let’s say like there’s some agreement in that’s what it is, and there’s 30% or 40% difference between what the country’s different faculties do, but there’s no full agreement.” 2*

## **Theme Three: Links Between Standardization and Care**

The outcome of Medical Education is healthcare delivery. Certification and standardization tend to link education and healthcare while assuring the population that healthcare workers are proficient. The themes and quotes below depict how this phenomenon would take place in Colombia.

### **Standards in learning lead to standards in care**

Participants suggested that an exam built to evaluate primary care guidelines could eventually lead to general practitioners knowing and thus applying these guidelines in their day-to-day practice, keeping them up-to-date while linking education to healthcare delivery.

## **Representative Quote**

*“[...] [the] impact on the population is completely favorable because when knowledge is standardized this leads to standardizing service, you always see that when an exam is being given some evaluation criteria are set, and the person who is answering the exam has to know how they’re being graded; if I tell*

*a physician ‘look I’m going to ask you about the guide,’ ‘this guide is the one we apply in Colombia,’ ‘these are the X or Y standards,’ if I basically tell a physician what they have to know in order to be considered an updated physician and through which I am going to certify him or her, this is going to guarantee that it is standardized service.” 8*

### **Benefits for general practitioners**

Participants believe that a certification system would increase general practitioners’ proficiency in primary healthcare delivery, and this would change our community’s perspective of general practitioners.

### **Representative Quote:**

*“[...] it would improve for example competences in health promotion, in prevention, in what’s the first level, it’d improve primary healthcare delivery, it’d also change the patients’ perception and the medical community towards general practitioners. What happens? Patients do not believe in general practitioners, and the specialist doesn’t believe the general practitioner, that’s why general practitioners want to become specialists, they feel lesser ones, they feel incomplete.” 6*

### **Theme Four: Political Atmosphere**

Given that education should be regulated by higher entities like Ministries or gremial associations, the following quotes explain the current political setting in which the certification process would be created.

### **Cannot demand certification**

Participants believe that a certification system cannot come from a weak healthcare system which does not look out for its employees.

### **Representative Quote**

*“[...] in a health system like ours, deficient in human resources and absolutely fragmented in sectors in the large cities, badly supplied, badly paid...my starting point is that we can't demand an educational certification process when we are within a health system that doesn't offer any sort of guarantees to those professionals...” 4*

### **Social context**

Participants acknowledge the social and cultural differences in the country and believe that evaluation should be decentralized.

### **Representative Quote:**

*“[...] we've got some minimum points on which we've agreed...which are the ones we've got to evaluate, but in the way that I'm going to design an exam in Bogotá, differs to that in which I'm going to do it in Cali, in Nariño, or in the Coast...They've got to have some adjustments because over here the whole issue of context is strong...then if we don't handle the whole inter-cultural issue, the whole culture issue, the whole ethic and cultural issue...” 2*

### **Lack of trust in the system**

Rather than lack of trust in general practitioners, interviewees highlight the fact that general practitioners are working in a system that people do not trust themselves, and the conditions in which they have to work makes it challenging to succeed.

### **Representative Quote:**

*“[...] I think this mistrust has to do not only with the physician's quality but the mistrust before the health system. The problem's that most of general practitioners in Colombia work under coercion and pressure by health providers, that do not permit them to make free decisions, that is, general practitioners are restricted, for example, to the number of studies or lab exams or radiological studies or any sort of diagnostic that you can ask your doctors, that is there's no respect for general practitioners because that*

*kind of thing generates more costs and if there's no quality education well it generates more costs because he/she doesn't even know where it is adequate to send [...] Then I think that whatever is done in favor of medical education is the quality of the education, [it] will necessarily have an impact on health, but also on the politics of the health system. 3*

### **No directions towards standards**

There is a current lack of direction from the state with regards to medical education. It is seen as a business and not a public health entity.

### **Representative Quote:**

*"[...] I'm convinced that it's so because there's no direction from the State, that is... the Ministry of Health or the Ministry of Education haven't taken the role in controlling the way medicine is taught in Colombia, there's no control over the medicine faculties that in many cases and sadly are just a business." 3*

### **Dichotomy on certification entity**

Participants did not agree on a single entity that could potentially be accountable for a certification process and the delivery of a standardized exam.

### **Representative Quotes:**

*"[...] the Ministry of Health, the Ministry of Health, has a room that is with handles where the Ministry of Education is and the Ministry of Health, and that's where postgraduate projects have to go through which are approved in the country, I think that it should be the Ministry the one handling that exam" 9*

*"[...] I think that for this to work out all faculties must be together ALL, the public ones, the private ones, the one with lesser weight, the ones with greater weight, the ones with money, the ones with no money, so we avoid barriers, and I do believe that ASCOFAME should be [the one]..." 7*

### **Seeking for specialty training**

General practitioners are perceived as mediocre and tend to see their role as transitory and focus on getting ready from specialty training rather than the importance of their current role.

### **Representative Quote**

*“[...] then when you ask me [about] the general practitioner's quality, it's overall mediocre because they're physicians who are always thinking that they're just transient as general practitioners in order to become specialists, and that, moreover, have lost the integral and overall vision of people because they're ever thinking that they're just there for the time being to then go ahead, then [they] guide their education process, and because of their doubts or motivations [they] turn down their quality as their general practitioners” 2*

### **Qualitative Data Analysis**

According to our data from the interviews, the purposes of a standardization system goes beyond obtaining a medical license. It is clear that all general physicians, specialists and subspecialists should obtain their title under a national alignment and a set of objectives common for all, which are currently non-existent. Rather than only an exam, certification is a process that should show a student's trajectory. If this process were to involve an exam, it has to be built in order for it to be an actualization tool for general practitioner that exposes them to the most prevalent pathologies and procedures in their region, linking them to the healthcare system and standardizing clinical practice amongst these doctors. National certification should be a prestigious and high stakes process in order for it to have an impact on education and future clinical practice. Having a certification process would imply that students should need additional time in order to prepare for a national exam. However, certification requirements should be obtained by all students. Failure to obtain certification would imply an additional education fee and less time on the work field for students and a failure by the University for not being able to train these students

and the Ministry of Health and Education for not supervising the University responsible for training the students.

There is a wide variation between quality of medical schools in Colombia. Resource distribution is uneven and practice centers are not standardized. In many of these circumstances, there is no assurance that there is an adequate formation process. Given that there is a lack of supervision by the Ministry of Health and Education, each medical school does what it can to produce their better version of a general physician. This translates in an extensive variety of general practitioners. Nevertheless, it is not desired to have every medical school be the same, but at least, 60-70% of the curriculum should be based on a mutual agreement. In order for a certification system to be successful, a national collaboration between faculties is mandatory. They should all have a saying in this process, especially since cultural, ethnical and social needs are different between each region of the country.

A certification process could bring alignment between the healthcare and education systems. If an examination component of the certification process would be implemented, diagnosis and treatment national guidelines would be evaluated in the exam, general practitioners would know what is expected from them and what content would be considered as updated. With an exam focused on national guidelines, general practitioners would increase their competencies in primary care, health promotion and disease prevention. This would eventually lead to a standardized medical attention by general practitioners leading to a more equitable healthcare system. Populations with limited access to the healthcare system would be taken care of by general practitioners who are updated and certified under national standards, decreasing the inequality gap. In addition, a certification process would change the perception of patients and specialists with regards to general practitioners, increasing trust in doctors.

The Colombia healthcare system currently lacks sufficient warranties for professionals who work for the system. There are challenges for general practitioners such as consult time restrictions and number of

medical tests that can be ordered per patient. This also leads to a general discomfort for the patients towards general practitioners. Inevitably, doctors who are initially trained as general practitioners in medical school, find this role as transitory and seek additional training as specialists. This is a consequence of a chronic lack of direction from the state with regards to medical education, and the absence of control over medical schools. The former can also be evidenced by the lack of agreement between participants when asked who the entity should be responsible for national certification for general practitioners.

## **Quantitative study design**

This was an observational, descriptive cross-sectional study.

## **Survey development**

A systematic approach to tool development was taken. The AMEE guide No. 87, *Developing a Questionnaire for Educational Research* was used as a framework to develop the survey<sup>23</sup>. Following, the third component of the guide is a synthesis of the literature review and the qualitative findings.

Survey constructs were developed from the qualitative analysis and the literature review. First, a description of the accountability of the system was addressed. One survey item was developed to evaluate the perception over current state regulation on medical education. The qualitative findings showed that stakeholders believed in certification but did not identify a clear implementation of the process. Questions that address the need for and acceptance of a standardization exam were implemented in the survey in construct number two. One of the biggest findings from the qualitative interviews is how standards in education can lead to a change in perception of general practitioners and improvement of health. Baseline

questions to evaluate current trust in GPs were included as well as questions that reflect how trust would change if GPs were backed up by an exam. Facts found in the literature about GPs were also added. Building upon this, a construct that could investigate the benefits of standardization was also included. Qualitative findings showed that a standardized certification system could be used as an instrument for actualization, thus a construct that explored standardization as a learning tool was added. Qualitative data portrayed substantial variation between medical schools, this is seen as a limitation of standardization, a question for this was incorporated. Finally, stakeholders couldn't agree on which entity should be responsible for implementing standardization, so a question to address this matter was added. *Table 2* shows a summary of the integration of qualitative findings and the literature to build survey constructs.

*Table 2: Construct Development*

| Qualitative Finding                                                                                                                                                                                                                                                                  | Literature Finding                                                                                                | Name of Construct                                    | Survey Questions |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|------------------|
| <p>Certification beyond examination</p> <p>Participants address the fact that a unique standardized exam is not enough for a national certification process.</p> <p>They argue that power should be distributed when it comes to assessing a student and that the process should</p> | <p>“[Exams] provide assurance that graduates have met minimum standards and are “fit for purpose”</p> <p>(18)</p> | <p>The general perception of a standardized exam</p> | <p>Q1, Q2</p>    |

|                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                     |                                        |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------|
| be well-grounded and balanced.                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                     |                                        |                   |
| No directions towards standards<br>There is a current lack of direction from the state with regards to medical education. It is seen as a business and not a public health entity.                                              | The Ministry of Health is in charge of health professional development and training, which is not done strictly. There is no regulation in training based on regional and national workforce supply and demand. Furthermore, the institution responsible for certifying health care professionals is the Ministry of Education. (6) | Current system                         | Q3                |
| Seeking for specialty training<br>General practitioners are perceived as mediocre and tend to see their role as transitory and focus on getting ready from specialty training rather than the importance of their current role. | GPs should be able to address 80% of the health concerns of the population (4)                                                                                                                                                                                                                                                      | Perception of general practitioners    | Q4, Q5, Q6        |
| Benefits for general practitioners                                                                                                                                                                                              | “A healthcare provider who is not properly trained will generate a gap                                                                                                                                                                                                                                                              | Benefits of a national standardization | Q7, Q11, Q12, Q13 |

|                                                                                                                                                                                                                |                                                                                                       |                                  |         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|----------------------------------|---------|
| Participants believe that a certification system would increase general practitioners' proficiency in primary healthcare delivery, and this would change our community's perspective of general practitioners. | in healthcare delivery" (Flexner, 2010)                                                               |                                  |         |
| Social context                                                                                                                                                                                                 | -                                                                                                     | Limitations of standardization   | Q9      |
| Participants acknowledge the social and cultural differences in the country and believe that evaluation should be decentralized and differences taken into account.                                            |                                                                                                       |                                  |         |
| Standards in learning lead to standards in care                                                                                                                                                                | "Structured feedback on their examination and scores is useful for them to learn from this experience | Standardization as learning tool | Q8, Q10 |
| Participants suggested that an exam built to evaluate primary care guidelines could eventually lead to                                                                                                         | and help them progress" (18)                                                                          |                                  |         |

general practitioners  
 knowing and thus applying  
 these guidelines in their day-  
 to-day practice, keeping  
 them up-to-date while  
 linking education to  
 healthcare delivery.

|                                                                                                                                                                         |   |                            |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|----------------------------|-----|
| Dichotomy on certification<br>entity                                                                                                                                    | - | Administrative<br>findings | Q14 |
| Participants did not agree on<br>a single entity that could<br>potentially be accountable<br>for a certification process<br>and the delivery of a<br>standardized exam. |   |                            |     |

Fourth, items were developed, and expert validation was conducted to support content validity of the survey. The experts were thesis committee members who are familiar with the context and have experiences with the construct in other contexts. In addition, external members from Universidad de Los Andes were invited as context and research experts. A total of 4 experts participated in the expert

validation process in which they assessed representativeness, clarity, relevance, and distribution of items.<sup>23,25</sup>

The sixth step was to conduct cognitive interviews. This will provide evidence of the response process validity. The goal was to show how potential respondents think through the process of answering each item and if this matches the intent of such. A focus group was carried out with 39 participants from the Anesthesiology department from Hospital Universitario Fundación Santa Fe de Bogotá via Zoom. The sample was representative of the survey population regarding different backgrounds, different levels of training, age and gender. Here, a “thinking out loud” technique was carried out for each item. After carrying out the focus group, two questions were restructured due to lack in clarity, and one was eliminated.

Finally, pilot testing was carried out by 25 voluntary respondents from the same group described before recruited via email by the research team. The pilot group was recruited through convenience sampling. The distribution of variables was analyzed, and questions that didn’t follow a normal distribution were restructured. Two questions with a dichotomous answer were restructured into a 5-point Likert scale and two were eliminated.

## **Instrument Description**

### **Demographic Variables**

The demographic variables were obtained from the survey respondents to characterize the population. We predict that responses from different age groups will vary, given generational differences and experience in the workforce. Academic demographics were designed to describe the type of undergraduate training

of survey respondents. For example, formal training is different at a public university than at a private one, and formal training also varies in different regions. Professional demographics and current job information are going to determine the stage in training at which the participant is and his or her location in the country. As mentioned before, there is an important difference concerning funding and healthcare personnel between metropolitan and rural areas.

### **Survey Question Prototypes and Response Categories**

Evaluation of question consistency in each construct was carried out by calculating Cronbach alpha coefficients. The first construct, description of the accountability of the system, was measured via a single item in which state direction over medical education was explored. The second construct was need and acceptance of an examination within a certification process and was made up of two questions. No psychometric calculation was done for this construct since one question addressed the need and another the acceptance of the exam, so items are expected to be independent from each other. The same case was found in the construct of standardization as a learning tool. Construct number three evaluates current perception on general practitioners. Scale reliability for these items is 0,72 with an average interitem covariance of 0.5, meaning that there is some consistency between the items. Construct four addresses the impact of standardization over general practitioners and healthcare delivery. Average item covariance is 0.15 and scale reliability coefficient is 0.2. This shows that items in this construct are not correlated. The final constructs, entity responsible for standardization and limitations of standardization is measured by a single question.

There are no other surveys in the literature that have assessed Doctors' perception of the need for a national standardized exam. Items in this survey resemble the main topics that were obtained from the

qualitative analysis. Items in which additional information was required or in which discrepancies were found between participants were prioritized. Items were also built taking into account national literature about the current state of Medical Education and the perception of GPs. Final survey can be found in *Appendix D*.

### **Survey Dissemination, Data Collection, and Analysis**

A convenience sample was used given the lack of access to a total population of doctors via a formal institution. The survey was distributed online, using *Qualtrics* platform, and disseminated through institutional emails backed up by context expert N. Mejia and Harvard Medical School (HMS), Boston, USA. Emails were sent to all alumni and teachers of Universidad de Los Andes (n=1080). Reminder emails were sent one week after the original email. Survey results were downloaded from *Qualtrics*. This information is stored in a secure codebook in Excel to which only the research team has access. Data analysis was carried out on Stata software. Variable distributions and descriptive statistics of each item were obtained.

Demographic characteristics that were considered were:

- Type of training: This is an independent, categorical polychotomous variable in which participants' level of training will be determined. We are interested in seeing how GPs' responses differ from specialists and subspecialists.
- Age: This is an independent, continuous variable. The generational difference between doctors and their perception of different constructs is worth exploring.
- Gender: This is an independent dichotomous variable. We would like to know if there is a gender difference in construct perception.

Correlations of specific variables are shown on *Table 3*.

*Table 3: Variables for correlations and null hypothesis*

| Construct                            | Variable one            | Variable two     | Null hypothesis                                                                                                                                                |
|--------------------------------------|-------------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Is an exam needed for certification? | Question 1, question 2  | Gender           | In the population, women and men are equally likely to think that a standardized exam for a certification process is needed.                                   |
| Is an exam needed for certification? | Question 1, question 2  | Type of training | In the population, general practitioners and specialists are equally likely to think that a standardize exam for a certification process is needed.            |
| Acceptance of an exam                | Question 2              | Age              | In the population, older and younger doctors are equally likely to think that a standardize exam for a certification process would be accepted                 |
| Impact of an exam                    | Question 7, question 11 | Age              | In the population, older and younger doctors are equally likely to think that a certification process would change their perception on general practitioners   |
| Impact of an exam                    | Question 12             | Type of training | In the population, general practitioners and specialist are equally likely to think that a certification process would increase healthcare quality in Colombia |

## Quantitative Results

### Sample Description

*Table 4: Demographic description of survey participants*

| Variable              | Measurement     |
|-----------------------|-----------------|
| Age                   | Median 32 years |
| Male                  | 47.50%          |
| Born in Bogota        | 59.5%           |
| Public School         | 6.66%           |
| Private School        | 93.6%           |
| Interns               | 7.6%            |
| Rural doctors         | 3.8%            |
| Residents             | 21.5%           |
| General Practitioners | 45.6%           |
| Specialists           | 10.1%           |
| Subspecialists        | 11.4%           |
| Additional training   | 28%             |
| Metropolitan area     | 85%             |
| Private sector        | 80%             |

A total of 1080 surveys were distributed via institutional email to faculty and medical graduates of Universidad de Los Andes, Bogotá, Colombia. A total of 80 participants answered the survey and 78

completed it. Table 4 shows demographic data from our sample. The median age of the population was 31.9 with a lower quartile of 26 and an upper quartile of 32 (Figure 2). Approximately 51% of the sample was female and 47.5 % male. Out of the 80 participants, 47 were born in Bogota. Five respondents went to public schools while 74 went to private schools. In the sample there was a total of 6 interns, 3 rural doctors, 17 residents, 36 general practitioners, 8 specialists and 9 subspecialists. 28% of participants had additional training like a master's degree, PhD or MBA. 85% of the sample works in the metropolitan area and 80% are working in the private sector.

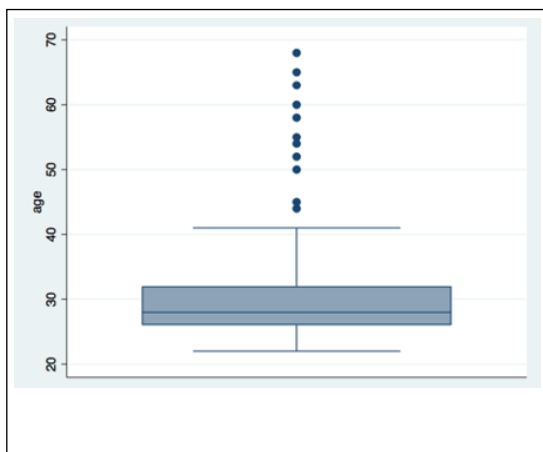


Figure 2: Boxplot of age distribution in survey sample

## Construct Perception

56% of our sample strongly agreed that “a medical knowledge test for general practitioner certification is needed in Colombia” (Figure 3). Regarding acceptance of an exam, 38% of participants believed that it would be somehow unlikely that this would be accepted by doctors in Colombia, while 36% thought it would be somehow likely (Figure 4). State direction over medical education was perceived slight or not existent by 55% of respondents (Figure 5). 43% of participants said that their perception on general practitioners would change a lot if a certification process would back them up. In addition, 61% of participants believe that periodic actualization for general practitioners is extremely needed in Colombia. Concerning how fair would a certification process be for students in different regions in the country, 20% answered that it would not be fair at all, 17% agreed that it would be somehow unfair, while 10% said it

would be extremely fair. 51% agreed that a certification process would increase the quality of medical graduates in Colombia a lot, and 52% said it would increase the quality of healthcare delivery in our country. When considering which entity should be responsible for implementation of a national standardized exam, 35% of participants think it should be the Association of Medical Schools (ASCOFAME), 20% believed the Ministry of Education should be responsible and 16.25% of our sample said a new entity is needed (Figure 6). Table of results can be found on *Appendix E*.

### Statistical Analysis

New variables were created in which constructs could be measured and evaluated. Demographic variables were adjusted to determine if differences could be found between younger and older doctors (cut off point at the age median), specialists and general practitioners and male and female participants. Statistical significance was determined at a  $p$  value  $< 0.05$ . Correlations between demographic variables and constructs were not statistically significant (*Table 5*). We fail to reject the null hypothesis.

*Table 5: Pearson chi correlations and p value*

| Variable 1           | Variable 2                         | Pearson's<br>coefficient | P<br>value | Null hypothesis                                                                                                              |
|----------------------|------------------------------------|--------------------------|------------|------------------------------------------------------------------------------------------------------------------------------|
| Sex (female or male) | Q1 > 3<br>(A lot and<br>extremely) | 0.58                     | 0.45       | In the population, women and men are equally likely to think that a standardized exam for a certification process is needed. |

|                                                                                                                |                                     |      |      |                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------|-------------------------------------|------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Young doctors (< 32 years)                                                                                     | Q1+Q2 (total Likert score 7)        | 7.26 | 0.07 | In the population, younger and older doctors are equally likely to think that a standardized exam for a certification process is needed and accepted.             |
| Specialists (specialists and subspecialists)<br>GPs (interns, rural doctors, general practitioners, residents) | Q1+Q2 (total Likert score 7)        | 1.19 | 0.28 | In the population, general practitioners and specialists are equally likely to think that a standardized exam for a certification process is needed and accepted. |
| Young doctors (< 32 years)                                                                                     | Q2 > 3 (A lot and extremely)        | 0.02 | 0.88 | In the population, older and younger doctors are equally likely to think that an standardize exam for a certification process would be accepted                   |
| Young doctors (< 32 years)                                                                                     | Q4+Q7 + Q8 (Total Likert scale > 9) | 0.94 | 0.34 | In the population, older and younger doctors are equally likely to think that a certification process would change their perception on general practitioners      |

|                                                                |                          |      |      |                                                                                                                                     |
|----------------------------------------------------------------|--------------------------|------|------|-------------------------------------------------------------------------------------------------------------------------------------|
| Specialists                                                    | Q4+Q7 + Q8               | 0.22 | 0.64 | In the population, general                                                                                                          |
| (specialists and subspecialists)                               | (Total Likert scale > 9) |      |      | practitioners and specialist are equally likely to think that a certification process would increase healthcare quality in Colombia |
| GPs (interns, rural doctors, general practitioners, residents) |                          |      |      |                                                                                                                                     |

## Quantitative Data Analysis

The population characteristics of our sample resemble those described by the Ministry of Health in 2015, where out of 92,000 doctors, 76% were GPs and 23% specialists. Additionally, 62% of doctors were 26-35 years of age while 5.9% were 51 or older. In our sample, 66.25% of participants were GPs and 21% were specialists. We had a skewed distribution regarding age with a median of 31.9, a lower-quartile of 26, and an upper-quartile of 32. This means that 75% of our data points are found below 32 years of age, which again matches well with national demographics.

To begin with, the distribution of the variable of the needs of a standardized exam within a certification process is highly skewed to the right (figure 3), meaning that participants tend to answer favorable

options. Approximately 79% of answers were between *a lot* and *extremely*, showing that respondents mostly believe that having a standardized examination within a certification process is important.

Second, although participants answered positively about having an exam, there was split opinions in the perceived acceptance of an exam: about 38.75% of answered “somehow unlikely” and 36.25% “somehow likely”. Even though there is no clear trend for this distribution, the split distribution suggests that in our population, these two answers were the most popular.

Regarding the entity that should be responsible for implementing the exam, there are slight differences between each institution, being the first ASCOFAME with 35%, the Ministry of Education with 20%, and the Ministry of Health with 17.5%.

For this study, we carried out 6 hypothesis tests, none of which achieved statistical significance. In this sample, women and men are equally likely to think that a standardized exam for a certification process is needed. Younger and older doctors as well as specialists and GPs are equally likely to believe that a certification process is needed and would be accepted. Younger and older doctors are equally likely to believe that a certification process would change their perception of GPs. Specialists and GPs are equally likely to believe that a certification process would increase healthcare quality in Colombia.

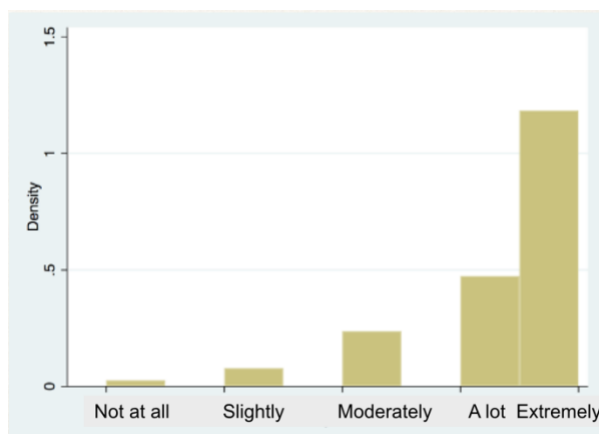


Figure 3: Histogram Representation of Question 1: Evaluate the following statement: "A medical knowledge test for general practitioner certification is needed in Colombia?"

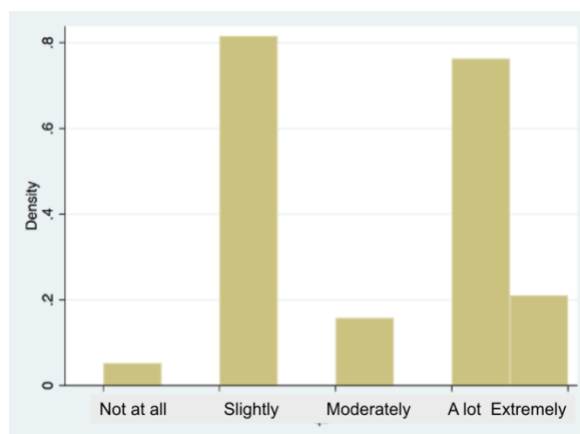


Figure 4: Histogram Representation of Question 2: Do you think a medical knowledge test for general practitioner certification would be accepted by doctors in Colombia?

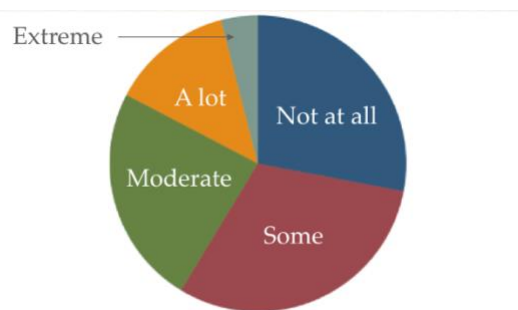


Figure 5: Pie Chart Representation of Question 3: In your opinion, is there any degree of state direction over medical education in Colombia?

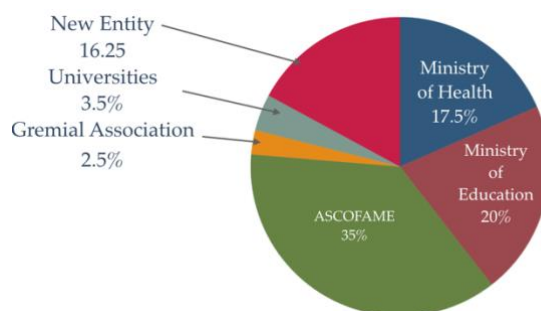


Figure 6: Pie Chart Representation of Question 14: Which entity should be responsible for implementing a national standardized medical exam in Colombia?

## Mixed Methods Results

This mixed-methods exploratory study created a framework for a topic that hadn't been described in the Colombian context. Here, quantitative features are improved by the understanding of the social and cultural context of the problem. Likewise, quantitative results helped to give precision to some of the

qualitative results that were inconclusive or needed a larger group perspective. Mixed methods results are summarized in *Table 6*.

*Table 6: Mixed Methods Results*

| Qualitative Subtheme                                                                                                                                                                                                                                                                                        | Quantitative variable                          | Statistical representation                                                                                                                                                                                                           | Mixed-Methods interpretation                                                                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Certification beyond examination</p> <p>Participants address the fact that a unique standardized exam is not enough for a national certification process. They argue that power should be distributed when it comes to assessing a student and that the process should be well-grounded and balanced</p> | <p>Q1</p> <p>Correlations and distribution</p> | <p>56% of the sample strongly agreed that an exam is needed in a certification process.</p> <p>No statistically significant difference between young doctors, male and female doctors and specialists and general practitioners.</p> | <p>A certification process is more than just an examination, however, 56% of the study participants believe that a standardized exam is needed as part of a certification procedure for general practitioners in Colombia.</p> |

|                                                                                                                                                                                                                                                                                                                                                         |                                 |                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Closing the gap between universities</p> <p>A high-stake standardized exam could be used as a tool in which students demand a better quality of education and faculties can compare to other types of education and curricula and to themselves at different points of time.</p> <p>This said in a heterogenous economical and academic context.</p> | <p>Q 10</p> <p>distribution</p> | <p>42% of participants believed that a standardized exam would be very relevant in the formation of general practitioners in Colombia and 35% believe it would be extremely relevant.</p> | <p>Standardized examination would bring relevant information to students and faculties when comparing in an objective manner medical training in different faculties and regions. 77% of the sample believe that an exam would be more than relevant in the formation of general practitioners.</p> |
| <p>Standards in learning lead to standards in care</p> <p>Participants suggested that an exam built to evaluate primary care guidelines could eventually lead to general practitioners knowing and thus applying these guidelines in their day-to-day practice,</p>                                                                                     | <p>Q 12</p> <p>distribution</p> | <p>52% of the sample believes that a standardized exam would increase healthcare quality in Colombia a lot and 23% extremely.</p>                                                         | <p>A standardized examination within a certification process can increase healthcare quality a lot (52%) or extremely (23%) probably because it would increase GPs' knowledge and applicability of primary care guidelines, leading to</p>                                                          |

|                                           |                                  |                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| linking education to healthcare delivery. |                                  | standardized, high-quality healthcare delivery.                                                                                       |                                                                                                                                                                                                                                                                                                                                     |
| Benefits for general practitioners        | GP distribution and correlations | 43% of participants said that their perception on general practitioners would change a lot if a certification process would back them | Participants believe that a certification system would increase general practitioners' proficiency in primary healthcare delivery, and this would change our community's perspective of them. In fact, up to 43% of respondents believe that a certification process would change their perspective of general practitioners a lot. |

|                                                                                                                                                         |              |                                                                                                                                                                               |                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No directions towards standards                                                                                                                         | Q 3          | 28.75% of the sample                                                                                                                                                          | More than half of our sample                                                                                                                                                                    |
| There is a current lack of direction from the state with regards to medical education. It is seen as a business and not a public health character.      | distribution | believes that there are few state directions over medical education while 26.25% believe there is no direction.                                                               | believes that there is few to none state direction over medical education in Colombia, showing how it is seen as a business rather than a key player in healthcare delivery.                    |
| Dichotomy on certification entity                                                                                                                       | Q 14         | 35% of participants think                                                                                                                                                     | There is a lack of agreement                                                                                                                                                                    |
| Participants didn't agree on a single entity that could potentially be accountable for a certification process and the delivery of a standardized exam. | distribution | it should be the Association of Medical Schools (ASCOFAME), 20% believe the Ministry of Education should be responsible and 16.25% of our sample said a new entity is needed. | on which entity should be responsible for implementing a national standardized exam. 35% of survey participants believe that ASCOFAME should be responsible for the implementation of the exam. |

## Discussion

Assessment in standardization has also been used to link healthcare delivery to population needs and advocate for an updated medical community. Since the Flexner Report, state or gremial regulation over medical education has been adopted by many countries because a standardization process can help match a healthcare workforce with population health needs. However, Colombia remains behind. This mixed-methods exploratory study used qualitative methods to build a theoretical framework that could explain the lack of standards and quantitative methods to evaluate perceptions on a possible certification system while exploring the social context around this matter in Colombia.

### The importance of setting standards

In this study, stakeholders argued that a certification process would be valuable for students as well as faculty. For example, one interviewer commented: “ *[There are] faculties in smaller cities that do not have a university hospital nor have they got contact at a level that one may say it can ensure that this young professional is getting [a] good education, then a standardized exam somehow is going to “pressure” the universities and the students so they can demand efforts from each other.*” This quote is further made apparent when taking to account Colombia’s current situation, where medical education is variable, students train in diverse facilities and with different curricula, but population needs are mostly the same when limited to a region<sup>21</sup>. Indeed, standardization would bring relevant information to students about how they are doing compared to others trained either under similar circumstances or with different curricular and learning environments. Faculty would also benefit since comparison in an objective manner of medical training in different scenarios and regions would be allowed. This resonates with findings from perception studies on exams that already exist<sup>26</sup>. As stakeholders’ have pointed out with an objective

measurement tool, students and schools can “demand efforts from each other”. This claim is supported by quantitative findings which suggest that 77% of the sample believe that an exam would be more than relevant in the formation of general practitioners. This is an example of how setting standards in medical education can benefit both students and faculty.

The results of this study also demonstrate that stakeholders believe the purpose of a standardization system goes beyond obtaining a medical license, and standards have to be set before pursuing a certification process, qualitative results show that the current medical education system has “*[...] too much heterogeneity, the goal is not for all to be the same because there’s got to be some difference between faculties, [...] but there’s no full agreement*”. This quote suggests that the first step towards a standardization system is creating a common set of competencies for all medical graduates. The results from this study supports the idea that general physicians, specialists, and subspecialists should obtain their title under a national alignment and a set of objectives common for all, which are currently non-existent.

### **The importance of testing**

Standardization can be a process that involves only competency alignment or additional procedures like testing students. According to the literature, national licensing exams drive students’ learning, highlighting their importance in certification and when setting standards<sup>26</sup>. This study shows that 78.8% of participants believe that an examination should be part of a certification process. Stakeholders agreed, adding that “*[...] a general knowledge exam should count, a structured clinical exam should count, that shows how they solve clinical situations. But there should also be mixed in some public health issues, how they manage to solve this type of things, I’d also love it that there’d be a portfolio*”. Our results highlight that in a Colombian context a knowledge exam is desired, but certification should go beyond a

standardized examination. Even if an exam is needed, it is not enough to show a complete profile of students.

According to our data, if the examination is done purposefully, a standardized test may bring benefits for both patients and general practitioners. For example, one interviewee suggested: “[...] *if I tell a physician ‘look I’m going to ask you about the guide,’ ‘this guide is the one we apply in Colombia,’ ‘these are the X or Y standards,’ if I basically tell a physician what they have to know in order to be considered an updated physician and through which I am going to certify him or her, this is going to guarantee that it is standardized service*”. The prior quote shows that when considering the content of an exam, diagnosis, and treatment national guidelines should be evaluated. General practitioners would know what would be expected from them and what content would be considered updated. The former indicates that with an exam focused on national guidelines, general practitioners might increase their competencies in primary care, health promotion, and disease prevention. According to our participants, this would eventually lead to standardized medical attention leading to a thorough delivery of health.

Even though the importance of the examination was highlighted by stakeholders and the literature, there is concern about the acceptance of a test for GPs in Colombia. Only 56% of our sample strongly agreed that a medical knowledge test for general practitioner certification is needed in Colombia. In addition, acceptance of a knowledge test is doubted since 38% of participants stated that it would be unlikely for a standardized exam to be accepted. Participants in this study also acknowledged that implementing an exam would imply additional training time for students, accounting for more unpaid productive years. The above describes the difficulty of generating change in the medical education system of Colombia. According to Swanson et al, national licensing exams will become more and more common over the years, given changes in medical education that have highlighted their need in different contexts<sup>27</sup>. However, further evidence is needed in order to explore the stability of our findings. Age, in particular, is

an important factor related to the acceptance of standardized testing in other contexts. Achieving larger sample sizes, using different sampling methods, and involving public and private academic and medical organizations in Colombia are opportunities that should be considered in further studies

### **The impact education has on patients' perspective**

One of the issues standardization can address is the lack of trust in general practitioners. In this study, 27% of participants would trust GPs below slightly and 51% would trust them moderately. However qualitative results show that setting standards “[...] *would improve for example competences in health promotion, in prevention, in what’s the first level, it’d improve primary healthcare delivery, it’d also change the patients’ perception and the medical community towards general practitioners*”. Our results suggest that the standardization of education could bring a social phenomenon that would benefit doctors and patients. Stakeholders expressed that a certification process may change the perception of patients and specialists concerning general practitioners, increasing trust in doctors. These findings partially support previous research. In a 2000 study on factors influencing patient’s choice of GPs, board certification was the most important <sup>28</sup>. This, taken together with the results of this study, demonstrates that certification is an important factor in patient’s trust of their physician.

Qualitative results demonstrate that our participants believe that a certification system would increase general practitioners’ proficiency in primary healthcare delivery, overseeing that they are properly trained and updated to take care of communities. By increasing their clinical knowledge and confidence plus the accountability of being supported by a standardized knowledge test, patients’ trust may be regained. Up to 43% of respondents believe that a certification process would change their perspective of general practitioners significantly. There was no difference between younger and older doctors showing an additional advantage of certification in Colombia. Studies have shown how certification is positively

associated with healthcare outcomes. A 2006 study demonstrated that board certified in cardiology, internal medicine or family medicine were more likely than non-certified doctors to prescribe better quality of treatment for myocardial infarction<sup>29</sup>. This is an example of the ways education can be used as a tool to address a health system issue.

### **Accountability for student training**

Our data suggests that a standardization system has to be backed up by accountability. Our results show a general sense that *“there’s no direction from the State, that is... the Ministry of Health or the Ministry of Education haven’t taken the role in controlling the way medicine is taught in Colombia, there’s no control over the medical faculties that in many cases and sadly are just a business.”* Quantitative findings agree with this statement, 55% of the sample believes that there is little to no state direction over medical education. This study implies that an overseeing entity should regulate and implement the process of standardization. This further supported by international examples like the USMLE, a series of standardized exams overseen by national licensing authorities in the United States<sup>30</sup>. Our study suggests that in current setting of medical education, government institutions have failed to supervise medical schools and thus doctors’ training.

The former is underlined by the fact that stakeholders could not agree on a single entity to regulate a standardized certification process. Some argued for medical schools and associations: *“[...] I think that for this to work out all faculties must be together ALL, the public ones, the private ones, the one with lesser weight, the ones with greater weight, the ones with money, the ones with no money, so we avoid barriers, and I do believe that ASCOFAME should be [the one]...”* While others believed that the government has the tools to provide this service: *“The Ministry of Health, has a room that is with handles where the Ministry of Education is and the Ministry of Health, and that’s where postgraduate projects*

*have to go through which are approved in the country, I think that it should be the Ministry the one handling that exam*". Concerning the quantitative findings of the entity that should be responsible for implementing the exam, there are slight differences between each institution, being the first ASCOFAME with 35%, the Ministry of Education with 20%, and the Ministry of Health with 17.5%. Our study did not demonstrate any statistically significant difference in our participants' preferences between the Ministry of Education, Ministry of Health or ASCOFAME. This might be because our sample size was too small. A powerful sample is needed to determine if there is a clear difference between them.

## **Conclusion**

The results of our study contribute to an early stage in the process of a major culture change—recognizing the need for standardization, achieving agreement on what standardization should include, and achieving agreement on who should oversee standardization. Setting standards in education is crucial to assure minimum competencies from physicians that lead to acceptable healthcare delivery. A mixed-methods approach was used to describe stakeholders' perception of the lack of certification systems for general practitioners in Colombia. It also portrays their perception of the characteristics, benefits, and limitations of a possible certification process for this population. Several recommendations can be provided based on the literature evidence, and the results of this study. We identified four pillars for a possible certification process: Setting standards, knowledge examination, control of education for social and healthcare outcomes, and regulatory entity presence and accountability.

First, the importance of a certification process relies on setting standards. By setting standards for undergraduate medical education, universities will have a common north and direct their curricula and training towards them. Standards must be aligned with community needs to link education and healthcare.

Standardization is important because it provides comparable information that can be used by students and faculty.

Second, a standardized exam is necessary within a certification process. Assessment motivates learners, increasing their proficiency in a certain subject. In this case, a knowledge examination that is linked to primary care and national guidelines will increase GPs' clinical knowledge and competencies eventually leading to standardized healthcare delivery. A national standardized exam would be a link between medical education and healthcare since the competencies to be evaluated would be aligned with society's needs as well as national guidelines. Further work is necessary when determining the strategies to be implemented for the possible acceptance of a standardized exam in the Colombian setting.

Third, changes in the regulation of education could eventually lead to an increase in trust toward GPs by standardizing knowledge and competencies, addressing one of the identified problems the lack of regulation has caused in Colombia. Also, having a rigorous process to back-up general practitioners would be one of the roads to possibly repairing a general trust between doctors and patients. The social phenomenon that arises from regulating education would strengthen the implicit contract between society and doctors.

Although this study cannot make any recommendations on the institution that should be responsible for implementing and carrying out a certification process, it has become clear that a lack of state and gremial presence is being felt by doctors. Unequal distribution of medical training is attributed to the lack of supervision over medical schools from higher entities. Given the important outcome of medical education, regulation is mandatory.

This study highlights how complex it is to analyze standardization in medicine in countries of the Global South. Establishing a standardized certification system for general practitioners in Colombia is necessary. Standardization implies the need for common competencies that would eventually decrease the substantial variation in Colombia's healthcare workforce. This would lead to lessening disconnection between society's expectations and physicians' performance and increase trust in GPs. In addition, standardization could contribute to establishing a system to monitor and improve the performance of GPs. Our healthcare system's backbone is general practitioners. They are patients' first encounter with a solution to health inquiries and in many cases the only one. Standardization could contribute to establishing a system to monitor and improve performance of GPs. Why leave it to chance when aligned education, certification, and examination can assure the quality of healthcare delivery Colombian doctors are providing?

## **Limitations**

Although this is the first study describe the current situation with regards to certification and standardization of Colombia's medical education from the perspective of stakeholders and doctors, and explore the possibility of standardization, it has several limitations. To begin with, the study had a small quantitative convenience sample that is not representative of the population. If this study was replicated with a bigger sample, statistical significance would be evident in some of the relationships. Even though the survey was distributed to a considerable number of doctors, response rates were also very low. Problems with response rate can be attributed to global pandemic and doctor's burnout, lack of contact with institutional email and lack of incentive to answer the survey. Likewise, qualitative recruitment was done purposefully and represents some of the stakeholder's perspective on the matter, however participation level from general practitioners was extremely low and focus groups were not carried out. In addition, most of the political group denied participation. Finally, even though the code book was

developed by two investigators, only one did the final analysis. Having two investigators for the whole process may have increased the validity of our results.

## **Further Research**

This investigation is the first step for a nation-wide survey. The research team is currently working on alliances with key agencies that will help reach medical schools around the country and disseminate the survey via institutional email. After obtaining and analyzing the data, this will be presented to other stakeholders that will eventually work for a possible certification system in Colombia. A stakeholder map was designed by the research team to determine who are the key stakeholders that will be approached with the results of this project (*Appendix D*).

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## Appendix

### Appendix A: COREQ Checklist

#### COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

| Topic                                          | Item No. | Guide Questions/Description                                                                                                                              | Reported on Page No. |
|------------------------------------------------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| <b>Domain 1: Research team and reflexivity</b> |          |                                                                                                                                                          |                      |
| <i>Personal characteristics</i>                |          |                                                                                                                                                          |                      |
| Interviewer/facilitator                        | 1        | Which author/s conducted the interview or focus group?                                                                                                   |                      |
| Credentials                                    | 2        | What were the researcher's credentials? E.g. PhD, MD                                                                                                     |                      |
| Occupation                                     | 3        | What was their occupation at the time of the study?                                                                                                      |                      |
| Gender                                         | 4        | Was the researcher male or female?                                                                                                                       |                      |
| Experience and training                        | 5        | What experience or training did the researcher have?                                                                                                     |                      |
| <i>Relationship with participants</i>          |          |                                                                                                                                                          |                      |
| Relationship established                       | 6        | Was a relationship established prior to study commencement?                                                                                              |                      |
| Participant knowledge of the interviewer       | 7        | What did the participants know about the researcher? e.g. personal goals, reasons for doing the research                                                 |                      |
| Interviewer characteristics                    | 8        | What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic                |                      |
| <b>Domain 2: Study design</b>                  |          |                                                                                                                                                          |                      |
| <i>Theoretical framework</i>                   |          |                                                                                                                                                          |                      |
| Methodological orientation and Theory          | 9        | What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis |                      |
| <i>Participant selection</i>                   |          |                                                                                                                                                          |                      |
| Sampling                                       | 10       | How were participants selected? e.g. purposive, convenience, consecutive, snowball                                                                       |                      |
| Method of approach                             | 11       | How were participants approached? e.g. face-to-face, telephone, mail, email                                                                              |                      |
| Sample size                                    | 12       | How many participants were in the study?                                                                                                                 |                      |
| Non-participation                              | 13       | How many people refused to participate or dropped out? Reasons?                                                                                          |                      |
| <i>Setting</i>                                 |          |                                                                                                                                                          |                      |
| Setting of data collection                     | 14       | Where was the data collected? e.g. home, clinic, workplace                                                                                               |                      |
| Presence of non-participants                   | 15       | Was anyone else present besides the participants and researchers?                                                                                        |                      |
| Description of sample                          | 16       | What are the important characteristics of the sample? e.g. demographic data, date                                                                        |                      |
| <i>Data collection</i>                         |          |                                                                                                                                                          |                      |
| Interview guide                                | 17       | Were questions, prompts, guides provided by the authors? Was it pilot tested?                                                                            |                      |
| Repeat interviews                              | 18       | Were repeat interviews carried out? If yes, how many?                                                                                                    |                      |
| Audio/visual recording                         | 19       | Did the research use audio or visual recording to collect the data?                                                                                      |                      |
| Field notes                                    | 20       | Were field notes made during and/or after the interview or focus group?                                                                                  |                      |
| Duration                                       | 21       | What was the duration of the interviews or focus group?                                                                                                  |                      |
| Data saturation                                | 22       | Was data saturation discussed?                                                                                                                           |                      |
| Transcripts returned                           | 23       | Were transcripts returned to participants for comment and/or                                                                                             |                      |

| Topic                                  | Item No. | Guide Questions/Description                                                                                                        | Reported on Page No. |
|----------------------------------------|----------|------------------------------------------------------------------------------------------------------------------------------------|----------------------|
|                                        |          | correction?                                                                                                                        |                      |
| <b>Domain 3: analysis and findings</b> |          |                                                                                                                                    |                      |
| <i>Data analysis</i>                   |          |                                                                                                                                    |                      |
| Number of data coders                  | 24       | How many data coders coded the data?                                                                                               |                      |
| Description of the coding tree         | 25       | Did authors provide a description of the coding tree?                                                                              |                      |
| Derivation of themes                   | 26       | Were themes identified in advance or derived from the data?                                                                        |                      |
| Software                               | 27       | What software, if applicable, was used to manage the data?                                                                         |                      |
| Participant checking                   | 28       | Did participants provide feedback on the findings?                                                                                 |                      |
| <i>Reporting</i>                       |          |                                                                                                                                    |                      |
| Quotations presented                   | 29       | Were participant quotations presented to illustrate the themes/findings?<br>Was each quotation identified? e.g. participant number |                      |
| Data and findings consistent           | 30       | Was there consistency between the data presented and the findings?                                                                 |                      |
| Clarity of major themes                | 31       | Were major themes clearly presented in the findings?                                                                               |                      |
| Clarity of minor themes                | 32       | Is there a description of diverse cases or discussion of minor themes?                                                             |                      |

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

**Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.**

## *Appendix B: Semi structured Interview Guide (Spanish)*

### Guía de entrevista semiestructurada

Quisiera empezar por agradecerle su asistencia el día de hoy. Mi nombre es Isabela Venegas y hago parte de los candidatos a maestría en educación médica de la facultad de medicina de la universidad de Harvard. Junto con un grupo de investigadores nacionales e internacionales, estamos llevando a cabo una investigación para entender el punto de vista de las instituciones involucradas en la educación médica en Colombia y sus líderes sobre la necesidad de un examen de conocimientos médicos dentro de un proceso de certificación para médicos generales. Este proyecto es parte de mi tesis de maestría. Su opinión y experiencia son muy importante para la investigación. Quisiera aprovechar esta oportunidad para recordarle que todo lo que se discuta en esta entrevista será confidencial, como fue explicado en el consentimiento informado. ¿Tiene alguna pregunta antes de empezar?

1. ¿Cuál es su opinión frente a un sistema de certificación para médicos generales en Colombia?
2. ¿Tiene alguna experiencia o conocimiento de sistemas de certificación para médicos en otros países?
  - a. *¿Puede contarme más sobre su postura o experiencia con ese sistema de certificación?*
3. ¿Cuál sería el propósito de la certificación de médicos generales en Colombia?
4. ¿Cuál es su opinión frente al nivel académico de médicos generales en Colombia para atender las necesidades en salud de la población?
5. Según su conocimiento, ¿por qué no hay un examen de conocimientos médicos para certificarse como médico general en Colombia?
  - a. ¿Usted considera que el ECAES es un examen de certificación?
6. ¿Cuál cree usted que podría ser el beneficio de un examen de conocimientos médicos estandarizado para los médicos generales en Colombia?
  - a. *¿Por qué?*
7. ¿Cuáles serían los aspectos negativos de realizar un examen nacional estandarizado de conocimientos médicos?
  - a. *¿Por qué?*
8. En su opinión ¿La calidad del médico general colombiano se vería influenciada al implementar un examen nacional estandarizado de conocimientos médicos?
  - a. *¿Cómo afectaría la atención en salud?*
  - b. *¿Cambiaría la percepción de los pacientes y la comunidad médica frente a los médicos generales?*
  - c. *¿Anticipa usted un posible impacto a nivel socioeconómico por la implementación de dicho examen?*
9. ¿Usted cree que este tipo de pruebas estandarizan el nivel de conocimientos de todos los médicos generales?
  - a. *¿Usted cree que estas pruebas podrían usarse para acceder a posgrados en Colombia?*
10. ¿Cuáles son algunos de los retos a los que se enfrentarían las instituciones involucradas en la educación médica al tratar de implementar dicho examen en Colombia?

11. ¿Cuales son algunas de las barreras que se encontrarían al diseñar, implementar y mantener dicho examen?
  - a. *¿Cuáles son algunas soluciones para esto?*
12. En su opinión, ¿cuál institución debería crear y administrar un examen de conocimientos médicos a nivel nacional?
  - a. *Si no existe el ente adecuado, ¿qué se necesitaría para crearlo?*
  - b. *Si sí existe, qué recursos necesitaría para lograr esto?*
13. Por favor enumere las categorías que considera necesarias en un examen nacional estandarizado de conocimientos médicos.
  - a. *Explorar cada una*
14. Después de la implementación, ¿Cómo se imaginaría la evaluación del impacto del examen?
15. ¿Tiene algo más que quisiera adicionar?

### ***Semi Structured Interview Guide (English)***

#### **Semi Structured Interview Guide**

I would like to start by thanking you for being here today. My name is Isabela Venegas and I am currently enrolled in Harvard Medical School's Master Program in Medical Education. I am conducting research to understand stakeholders' perceptions on the need of a medical knowledge exam for certification in Colombia. This is a part of my Master research thesis. Your opinions and experiences are very important for this research. I would also like to take this opportunity to remind you that everything said here is confidential, as was stated in the informed consent. Do you have any questions?

1. What are your thoughts about the current certification system for Colombian doctors?
2. Do you have any experience or knowledge of other certification systems for doctors outside Colombia?
  1. *(Follow up) Can you tell me about your views on that experience or that certification system?*
3. What is your opinion on general practitioners' knowledge for addressing general population health?
4. What is the purpose of certification for general practitioners in Colombia?
5. To your knowledge, why there is no certification examination for general practitioners in Colombia?  
*Please tell me more about ...*

6. In your opinion, are there problems with the current certification system for Colombian doctors?  
*In what way? Do you have any examples of that?*
7. What do you think could be the benefit that national standardized medical knowledge test would bring to general practitioners in Colombia?  
*Why?*
8. What are the negative aspects of introducing a national standardized medical knowledge test?  
*Why?*
9. In your opinion, could a national standardized examination for general practitioners affect the quality of Colombian medical graduates?
  1. *(Follow up) How would it affect the delivery of healthcare?*
  2. *(Follow up) Would an exam change anything for perception of general practitioners by patients and the medical community?*
  3. *(Follow up only for government officials) Do you anticipate this would have any socioeconomic impact nationwide?*
10. What is your opinion on aligning clinical training through a medical knowledge exam that create a minimum standard?
11. What are some of the challenges that stakeholders face when trying to standardize clinical training in Colombia?
12. What are some of the barriers that you anticipate stakeholders will have when designing, implementing and maintaining a national medical knowledge exam?
  1. *(Follow up) What are some of the approaches to solving them?*
13. In your opinion, what institution should have created and administrated a national medical knowledge exam?
  1. *(Follow up) If no, what would be necessary to create this institution?*
  2. *(Follow up) If yes, what resources would this institution need to fulfill this role?*
14. Can you list for me the items you think a national standardized examination should include?  
*List them and explore each one, in case the interviewee considers an exam as important.*
15. After implementation, how would you imagine evaluating the impact of the exam?
16. Is there anything else that you would like me to know regarding this subject?

### Appendix C: Codebook

| Code Name                  | Definition                                                                                                                                                                   | Example                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Entidad de certificación   | El entrevistado menciona quién o quién no debería encargarse del proceso de certificación                                                                                    | “Si yo creo que tendría que haber una entidad que se dedicase al examen, así como el ICFES se dedica a por ejemplo administración de exámenes de las pruebas saber en bachillerato y en colegio en general. Tiene que haber una institución que se encargue a eso porque eso no es una cosa para nada fácil” E1P5L34                                                                                                                                                                  |
| Contenidos fundamentales   | El entrevistado Hace énfasis en los temas que considera infaltables en la evaluación de médicos generales y que por tanto deberían incluirse en una prueba de certificación. | “la idea es que el examen se hiciera cada 2, cada 4, cada 5 años previo a la educación continua de los médicos y que explorara conocimientos, actitudes y prácticas” E2P3L5                                                                                                                                                                                                                                                                                                           |
| Evaluación del impacto     | El entrevistado hace referencia a las formas de determinar el efecto que tendría la certificación en la práctica de los médicos generales                                    | “Usted a los 5 años se da de cuenta que los graduados de 5 años después donde todos saben cómo lavarse las manos, hacer un interrogatorio estandarizado, cuáles son las cosas más importantes y sobre todo poner eso al contexto colombiano” E1P7L21                                                                                                                                                                                                                                  |
| Características del examen | El entrevistado habla del diseño del examen, tipo de preguntas o elementos generales a evaluar.                                                                              | “El examen debe dividirse en áreas o extensiones de conocimientos, actitudes y prácticas y en conocimientos debe hacer mucho énfasis en atención ambulatoria, en actividades de promoción de la salud, prevención de la enfermedad, diagnóstico temprano, en la afectación de determinantes sociales, en el enfoque de género, entonces conocimientos, actitudes frente a población vulnerable, hacia migrantes por ejemplo venezolanos, hacia diversidad sexual y prácticas” E2P6L16 |

| Beneficio                         | Explicación                                                                                                                                                                                                                                               | Ejemplo                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Actualización                     | promover el aprendizaje a lo largo de la vida y mantener al profesional actualizado. El entrevistado hace referencia a la posibilidad, que entrega una prueba de certificación, de valorar el contenido de conceptos médicos de los egresados en el país. | “es una carrera de toda la vida entonces entiende como una forma de mejorar la calidad de su accionar como médicos y como persona, permite que se actualice y tenga un mejoramiento continuo en conocimientos, habilidades y prácticas en medicina general y familiar” E2P2L4                                                                                                     |
| Excelencia                        | El entrevistado explica como una prueba de certificación ayudaría a asegurar o promover calidad en la formación médica a través de médicos bien preparados.                                                                                               | “Claro porque obligaría a la actualización permanente, cualificaría sus competencias en el saber, en el hacer, en el ser también , los haría mucho más competitivos” E2P3L13                                                                                                                                                                                                      |
| Mantenimiento de competencias     | Se hace referencia a el proceso de recertificación, aprendizaje a lo largo de la vida o educación continuada como ventajas del proceso de certificación                                                                                                   | “Entonces cuando dice anticipo hacia un posible impacto... yo lo consideraría favorable, porque no es la acreditación sola, la acreditación debe estar ligada a un sistema de educación continua, esa si la puede ofrecer el gobierno a través de las universidades, entonces no puede ser suelta solo acreditación sin que el estado ofrezca actualización a los médicos” E2P4L8 |
| Unificación de decisiones médicas | Utilidad de una prueba de certificación para estandarizar la toma de decisiones médicas e implementar                                                                                                                                                     | “Aquí el concepto principal sobre el que gira este tipo de estandarizaciones es lo que llaman los gringos el                                                                                                                                                                                                                                                                      |

|                                      |                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                      | la medicina basada en la evidencia                                                                                                                                                                      | “Standard of care” que es el estándar de cuidado que es el patrón ideal con el cual todo el mundo está de acuerdo exista o no exista evidencia científica de que es la manera adecuada que un especialista o un médico debe adoptar en una situación determinada pero que es aceptado por el común de los pares, si? Por eso digo que ese concepto no lo tenemos en el país y es ese el concepto sobre el que giran todos estos exámenes de certificación que es lo aceptado” E1P1L26 |
| Impacto en atención en salud         | Se habla del potencial de una prueba de certificación para cambiar conductas en los médicos generales o en su formación que lleve a mejoría en la atención en salud de la comunidad                     | “ Si se vería influenciado, porque afectaría la atención en salud porque mejoraría la atención en salud, mejoraría por ejemplo las competencias en promoción de la salud, en prevención, en lo que es primer nivel, mejoraría lo que es la atención primaria” E2P3L34                                                                                                                                                                                                                 |
| Reposicionamiento del médico general | El entrevistado hace referencia a la potencial capacidad de la prueba de certificación para mejorar la percepción de pacientes y/o de la comunidad médica del médico general, y la calidad del sistema. | “cambiaría la percepción de los pacientes y la comunidad médica frente a los médicos generales, que pasa el paciente no cree en el medico general y el especialista no cree en el medico general, por eso los médicos generales quieren ser especialistas se siente menos , se sienten incompletos” E2P3L35                                                                                                                                                                           |
| Herramienta de aprendizaje           | Se habla del proceso de certificación como una oportunidad de                                                                                                                                           | “preparación justo antes de preparar mis exámenes de                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|                                               |                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                               | adquisición de conocimiento médico importante y de calidad.                                                                                                                                                                                                                                                                                          | USMLE yo creo que fue el máximo punto de conocimiento médico en mi vida como médico general y también puedo decir algo parecido con los bords de mi especialidad que me llevaron a digamos que no solo a aprender sino a enfocar la profesión y la especialidad desde un punto de vista un poquito más, un poquito no. Desde un punto de vista estandarizado” E1PL26 |
| Mejora en las políticas de sistema de salud   | Se habla del potencial de una prueba para cambiar conductas en toma de decisiones de mandatarios estatales.                                                                                                                                                                                                                                          | “yo creo que todo lo que se haga a favor de la educación médica de la calidad de la educación, necesariamente va a impactar en salud, pero también en las políticas del sistema de salud.” E1P5L13                                                                                                                                                                   |
| Retroalimentación para facultades de medicina | El potencial de la prueba del proceso de certificación como herramienta informativa para implementar mejoras en la enseñanza por las facultades de medicina. Se hace referencia a la posibilidad de controlar la calidad de la educación entregada por las facultades de medicina, gracias a la información entregada por la prueba de certificación | “el examen debe ser retroalimentador frente a las facultades es decir tiene que haber un control de los entes tanto en el ministerio de salud como el ministerio de educación sobre las facultades que hoy en día francamente no existen” E1P5L37                                                                                                                    |
| Filtro para la especialización                | El potencial que tiene el proceso de certificación para ser utilizado como una pieza de información importante al momento de tomar decisiones respecto a la aceptación en los programas de residencia/especialización.                                                                                                                               | “permitiría también hacer cierto filtro para los que requieran hacer su especialización” E2P3L15                                                                                                                                                                                                                                                                     |

| Aspectos negativos          | Explicación                                                                                                                                                                                                    | Ejemplo                                                                                                                                                                                                                                    |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Riesgo de mala utilización  | El uso inadecuado de la prueba o de quienes la administren en términos de corrupción, favores políticos o falta de consecuencias/valoración de esta misma.                                                     | “si lo hace el estado se vuelve un requisito más, está sujeto también a presiones y no tiene un carácter de calidad un carácter gremial, entonces eso sería lo negativo” E2P3L22                                                           |
| Costos y talento humano     | El entrevistado menciona que la creación y mantenimiento de un examen requiere inversiones de tiempo y dinero importantes, y de la necesidad de personal capacitado para desarrollar y/o aplicar dicho examen. | “Una pregunta se puede demorar 3 o 4 años en llegar a un examen y tiene que evaluarse, tiene que probarse y eso cuesta dinero, porque se necesitan personas que sepan y tengan experiencia en ese tipo de exámenes” E1P4L26                |
| Examen escrito insuficiente | El entrevistado hace referencia a las limitaciones de una prueba escrita para evaluar todos los aspectos integrales de un profesional médico.                                                                  | “ningún examen puede medir en su totalidad la calidad de un profesional en ninguna profesión. Ahora eso no significa que los anule como instrumento de medición. En pocas palabras no es suficiente, pero es necesario el examen.” E1P4L13 |

| Motivos de la necesidad de certificación |                                                |                                                                                                                                                                                                                                                            |
|------------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Heterogeneidad                           | Diferencias en la calidad de médicos egresados | “Creo que es una necesidad que no se ha hecho que no se ha llevado a cabo. Y que hay mucha heterogeneidad entre las diferentes escuelas de medicina que hay en el país y yo creo que también en los currículos y en la calidad de médicos que está el país |

|                                   |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                   |                                                                                                                                                                                | graduando, que no es poca.<br>E1P1L11                                                                                                                                                                                                                                                                                                     |
| Diferencias entre universidades   | Diversidad en la calidad de herramientas de las universidades para formación de médicos. por ejemplo convenios con hospitales, instalaciones, currículo                        | “hay facultades que son muy ricas y que pueden lograr convenios docente asistenciales con todo ese dinero y hay facultades que no tienen ese dinero y hay facultades que no tienen ni siquiera hospitales.” E1P3L5                                                                                                                        |
| Preparación insuficiente          | Médicos generales preparados de forma inadecuada para atender a la población                                                                                                   | “Yo digo que digamos que siendo un poquito autocrítico yo creo que estamos parcialmente preparados, porque no hay estandarización [M1] yo por lo menos en mi experiencia de vida yo hice un rural en un pueblo al sur de Colombia muy pobre y yo me di cuenta siendo autocrítico que la formación que tenía me faltaba muchísimo” E1P2L28 |
| Ausencia de vigilancia estatal    | Falta de control del estado en docencia en medicina: Currículos, aranceles, calidad docente, calidad de egresados.                                                             | “Entonces vuelvo y digo, volviendo a la pregunta no hay un control del estado y de sus entes que deberían controlar sobre las facultades, sobre el cómo se enseña, sobre el que se enseña y como se administran esos, hasta hoy en día” E1P3L12                                                                                           |
| Reconocimiento internacional      | El entrevistador hace referencia a la importancia del examen para cumplir estándares internacionales y competir en este mercado                                                | “que estamos ante una nueva coyuntura de nivel internacional que exige ya estos procesos de acreditación y calidad.” E2P2L27                                                                                                                                                                                                              |
| Desconfianza en el médico general | El entrevistado menciona que la población se siente inseguro al ser tratado por un médico general, por lo cual prefiere ser atendido por un médico especialista. Esto tiene un | “Para que el modelo de atención se base en el médico general el actual modelo de atención y es el principal reto no se basa en el médico general, el actual modelo de                                                                                                                                                                     |

|  |                                                                        |                                                     |
|--|------------------------------------------------------------------------|-----------------------------------------------------|
|  | impacto en modelo de atención de salud actual basado en especialistas. | atención se basa en el médico especialista” E2P4L30 |
|--|------------------------------------------------------------------------|-----------------------------------------------------|

| Barreras                                       |                                                                                                                                                                                              |                                                                                                                                                                                                                               |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dualidad de ministerio de educación y medicina | El entrevistado menciona la ruptura entre los dos entes reguladores de la educación médica en Colombia, Ministerios de educación y de Salud, como un problema para generar la certificación. | “Digamos hay una dualidad entre el ministerio de salud y ministerio de educación, no hay un sistema de educación y certificación médica, no existe” E2P2L22                                                                   |
| Desinterés                                     | El entrevistado menciona la indiferencia frente a la importancia de este tema por entes estatales, sociedades médicas, facultades de medicina o el gremio como tal                           | “Yo estoy convencido que es porque no hay direccionamiento del estado, ósea el ministerio de salud o el ministerio de educación no han tomado la batuta en controlar la manera como se enseña la medicina en Colombia” E1P3L1 |

| Requerimientos del examen de certificación | Explicación                                                                                                                                | Ejemplo                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mejoría de docencia                        | Los resultados del proceso de certificación deben ser utilizados para implementar políticas y mejorar la docencia (pedagogías, profesores) | “si ese examen no es un requerimiento ni es un índice de calidad de las escuelas de medicina y no sirve para tomar políticas en cuanto a cómo redireccionar esa manera como se enseña la medicina, quien la enseña y como se controla esa docencia y esa pedagogía de la medicina, pues no sirve de nada realmente se vuelve un saludo a la bandera”. E1P3L |
| Indicador de Calidad                       | El entrevistado hace referencia a que se deben tomar medidas partir de los                                                                 | “ Si un examen no tiene consecuencias sobre las escuelas de medicina no van a tener ningún                                                                                                                                                                                                                                                                  |

|                    |                                                                                                                                                                |                                                                                                                                                                                                                                                                                                            |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                    | resultados del examen y/o que los resultados se pueden utilizar como medición de calidad de las universidades y/o egresados.                                   | interés en mejorar sus procesos para adecuarse al examen que sería el ideal para los mínimos académicos a los que tiene que llegar los estudiantes” E1P5L22                                                                                                                                                |
| Guia de estándares | El entrevistado explica que la prueba de certificación debería definir las corroborar las competencias mínimas de un médico para el ejercicio de su profesión. | “Yo creo que no es solo el examen no es solo la certificación es la estandarización de que es lo importante para eso cada uno de los colegios médicos y de las subespeciales deberían tener ese tipo de objetivos de cuál es el mínimo que debe tener un médico general en Colombia para graduarse” E1P4L2 |

## Appendix D: Final Survey (English)

### Demographics

| Category                     | Abbreviation | Name and definition                                     | Type                                     | Scale                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------|--------------|---------------------------------------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Personal demographics</b> |              |                                                         |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Age</b>                   | AGE          | Age of participant                                      | Quantitative, independent, discrete      | Whole numbers from 18                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Gender</b>                | GEN          | Gender participant identifies with                      | Quantitative, independent, polychotomous | 1= Female, 2= Male, 3= Other                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Place of birth</b>        | POB          | Department of the country in which participant was born | Quantitative, independent polychotomous  | 1= Amazonas, 2= Antioquia, 3= Arauca, 4= Atlantico, 5= Bolivar, 6= Bogotá DC, 7 = Boyacá, 8= Caldas, 9= Caquetá, 10= Casanare, 11= Cauca, 12= Cesar, 13= Choco, 14= Córdoba, 15= Cundinamarca, 16 = Guanina, 17 = Guaviare, 18 = Huila, 19= La Guajira, 20 = Magdalena. 21= Nariño, 22= Norte de Santander, 23= Putumayo, 24= Quindío, 25= Risaralda, 26= San Andres, 27= Santander, 28= Sucre, 29= Tolima, 30= Valle del Cauca, 31= Vaupéz, 32= Vichada, 33 = International |
| <b>Academic demographics</b> |              |                                                         |                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|                                               |      |                                                                                     |                                          |                                                                                                   |
|-----------------------------------------------|------|-------------------------------------------------------------------------------------|------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>Year of graduation from medical school</b> | GRAD | Year of medical school graduation                                                   | Quantitative, independent, discrete      | Whole numbers from 1                                                                              |
| <b>Name of Medical School</b>                 | MEDS | Name of medical school                                                              | Quantitative, independent polychotomous  | List of 64 medical schools                                                                        |
| <b>Type of school</b>                         | TYS  | Public or private medical school                                                    | Quantitative, independent dichotomous    | 1= Yes, 2= No                                                                                     |
| <b>Professional Information</b>               |      |                                                                                     |                                          |                                                                                                   |
| <b>Type of training</b>                       | TRAI | Type of medical training that the participant has                                   | Quantitative, independent polychotomous  | 1= Rural Doctor, 2= Resident, 3= General Practitioner, 4= Specialist, 5= Subspecialist, 6 = Other |
| <b>Other studies</b>                          | STUD | Other credentials that the participant has                                          | Quantitative, independent, polychotomous | 1= Master Degree, 2= PhD, 3= MBA, 4= Other                                                        |
| <b>Current Job Information</b>                |      |                                                                                     |                                          |                                                                                                   |
| <b>Region of work</b>                         | ROW  | Work setting of the participant, rural area, metropolitan area or medium town area. | Quantitative, independent, polychotomous | 1= rural, 2= Metropolitan area, 3= medium cities                                                  |

|                            |      |                               |                                       |                       |
|----------------------------|------|-------------------------------|---------------------------------------|-----------------------|
| <b>Type of institution</b> | INST | Public or private institution | Quantitative, independent dichotomous | 1= Public, 2= Private |
|----------------------------|------|-------------------------------|---------------------------------------|-----------------------|

*Final Survey\**

| <b>Number</b> | <b>Question</b>                                                                                                            | <b>Construct</b>                              | <b>Type of Variable</b>             | <b>Measurement</b>                                                |
|---------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------|-------------------------------------------------------------------|
| <b>1</b>      | Evaluate the following statement: "A medical knowledge test for general practitioner certification is needed in Colombia?" | The general perception a standardized exam    | Five-point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot, 5. Extremely |
| <b>2</b>      | Do you think a medical knowledge test for general practitioner certification would be accepted by doctors in Colombia?     | The general perception of a standardized exam | Five-point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot, 5. Extremely |
| <b>3</b>      | In your opinion, is there any degree of state direction over medical education in Colombia?                                | Current system                                | Five-point, unipolar response scale | 1. Not at all, 2. Some, 3. Moderately, 4. Strong, 5. Extreme      |

|          |                                                                                                                                                                 |                                        |                                     |                                                                   |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-------------------------------------|-------------------------------------------------------------------|
| <b>4</b> | To this date, would you trust a general practitioner (GP) to care for you or a family member?                                                                   | Perception of general practitioners    | Five-point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot, 5. Extremely |
| <b>5</b> | Do you believe that in Colombia the role of GP is transitory?                                                                                                   | Perception of general practitioners    | Five-point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot, 5. Extremely |
| <b>6</b> | To what extent do you agree with the following statement: "GPs can solve at least 80% of general population health inquires"general population health inquires" | Perception of general practitioners    | Five-point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot 5. Extremely  |
| <b>7</b> | Would your perception of general practitioners change if they were certified by a national standardized medical knowledge exam?                                 | Benefits of a national standardization | Five-point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot, 5. Extremely |
| <b>8</b> | Do you think a periodic actualization for GPs is needed in Colombia?                                                                                            | Standardization as learning tool       | Five-point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot 5. Extremely  |
| <b>9</b> | Do you believe a national certification system would be fair for students in different regions of the country?                                                  | Limitations of standardization         | Five-point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot 5. Extremely  |

|           |                                                                                                                                      |                                          |                                     |                                                                                                                                                            |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>10</b> | How relevant would a standardized exam be in the formation process of general practitioners in Colombia?                             | Standardization as learning tool         | Five-point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot, 5. Extremely                                                                                          |
| <b>11</b> | Could a national standardized examination for GPs increase the quality of Colombian medical graduates?                               | Benefits of a national standardization   | Five-point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot, 5. Extremely                                                                                          |
| <b>12</b> | Could a national standardized examination for GPs increase the quality of healthcare delivery in Colombia?                           | Benefits of a national standardized test | Five-point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot, 5. Extremely                                                                                          |
| <b>13</b> | Could a national standardized examination for GPs be used as an evaluation item when applying to postgraduate education? (Residency) | Benefits of a national standardized test | Five point, unipolar response scale | 1. Not at all, 2. Slightly, 3. Moderately, 4. A lot 5. Extremely                                                                                           |
| <b>14</b> | Which entity should be responsible for implementing a national standardized medical exam in Colombia?                                | Administrative findings                  | Single item selection               | Ministry of health, ministry of education, National medical school's association, a new entity is required, Colombian Medical College, Universities, other |

+ For this study, a certification system is the process by which a medical graduate obtains his or her medical license through state entities and regulations.

+ In this context, we define a national standardized medical knowledge exam as a mandatory test that is taken by all the candidates for a medical license. To obtain such a license, aspirants should obtain a minimum passing grade. Standardized tests are designed by overseeing authorities who can carry out a successful exam that is reliable and valid for making assumptions about a person's knowledge.

\*Final survey was carried out in Spanish.

### Final Survey (Spanish)

| Número                    | Pregunta                                          | Constructo                                             | Escala                                  | Opciones                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------------|---------------------------------------------------|--------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Datos Demográficos</b> |                                                   |                                                        |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 1                         | ¿Cuántos años tiene?                              | Edad del participante                                  | Cuantitativa, independiente, discreta   | Números enteros > 17                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 2                         | ¿Con qué género se identifica?                    | Género del participante                                | Cuantitativa, independiente, politómica | 1= Femenino, 2= Masculino, 3= Otro                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 3                         | ¿Dónde nació?                                     | Departamento del país en el cual el participante nació | Cuantitativa, independiente, politómica | 1= Amazonas, 2= Antioquia, 3= Arauca, 4= Atlántico, 5= Bolívar, 6= Bogotá DC, 7= Boyacá, 8= Caldas, 9= Caquetá, 10= Casanare, 11= Cauca, 12= Cesar, 13= Chocó, 14= Córdoba, 15= Cundinamarca, 16= Guainía, 17= Guaviare, 18= Huila, 19= La Guajira, 20= Magdalena, 21= Nariño, 22= Norte de Santander, 23= Putumayo, 24= Quindío, 25= Risaralda, 26= San Andrés, 27= Santander, 28= Sucre, 29= Tolima, 30= Valle del Cauca, 31= Vaupés, 32= Vichada, 33= Internacional |
| 4                         | ¿Hace parte de una minoría?                       | Grupos minoritarios                                    | Cuantitativa, independiente, politómica | 1= indígena, 2= negro 3= migrante, 4= otros 5= no soy parte de una minoría                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Datos Académicos</b>   |                                                   |                                                        |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 5                         | ¿En qué año se graduó de la facultad de Medicina? | Año de graduación como médico general                  | Cuantitativa, independiente, discreta   | Números enteros desde el 1                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 6                         | Facultad de Medicina donde se graduó              | Nombre de facultad de medicina                         | Cuantitativa, independiente, politómica | Abierta                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

|                                |                                                                    |                                                        |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------|--------------------------------------------------------------------|--------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7                              | ¿De que tipo de facultad de medicina se graduó?                    | Pública o privada                                      | Cuantitativa, independiente, dicotómica | 1= Publica, 2= Privada                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Información Profesional</b> |                                                                    |                                                        |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 8                              | Hasta el día de hoy ¿Qué tipo de entrenamiento médico ha recibido? | Nivel de educación médica que tiene el participante    | Cuantitativa, independiente, politómica | 1= Médico rural, 2= Resident, 3= Médico general, 4= Especialista, 5= Subespecialista 6 = Other                                                                                                                                                                                                                                                                                                                                                           |
| 9                              | ¿Tiene algún título adicional?                                     | Credenciales adicionales del participante              | Cuantitativa, independiente, politómica | 1= Maestría, 2= PhD, 3= MBA, 4= Otro 5= No                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Información Laboral</b>     |                                                                    |                                                        |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 10                             | ¿En qué escenario se encuentra practicando?                        | Escenario laboral ciudadano, rural o ciudad intermedia | Cuantitativa, independiente, politómica | 1= Rural, 2= Área metropolitana 3= Ciudades intermedias                                                                                                                                                                                                                                                                                                                                                                                                  |
| 11                             | ¿En qué región del país se encuentra?                              | Departamento en el cual trabaja el participante        | Cuantitativa, independiente, politómica | 1= Amazonas, 2= Antioquia, 3= Arauca, 4= Atlantico, 5= Bolivar, 6= Bogota DC, 7 = Boyacá, 8= Caldas, 9= Caquetá, 10= Casanare, 11= Cauca, 12= Cesar, 13= Choco, 14= Córdoba, 15= Cundinamarca, 16 = Guanina, 17 = Guaviare, 18 = Huila, 19= La Guajira, 20 = Magdalena. 21= Nariño, 22= Norte de Santander, 23= Putumayo, 24= Quindío, 25= Risaralda, 26= San Andres, 27= Santander, 28= Sucre, 29= Tolima, 30= Valle del Cauca, 31= Vaupéz, 32= Vichada |
| 11                             | ¿En qué tipo de institución se encuentra trabajando?               | Institución pública o privada                          | Cuantitativa, independiente, dicotómica | 1= Pública, 2= Privada                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 12                             | ¿En qué nivel se complejidad se encuentra trabajando?              | Nivel de complejidad en el que trabaja el participante | Cuantitativa, independiente, politómica | 1= Nivel 1, 2= Nivel 2, 3= Nivel 3, 4 = Nivel 4, 5= No sé, 6= No realiza trabajo clínico                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Encuesta</b>                |                                                                    |                                                        |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

|    |                                                                                                                                         |                                               |                               |                                                                                                                                                           |
|----|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 14 | ¿Cree usted que se necesita un examen de conocimientos para la certificación de médicos generales en Colombia?                          | Percepción general de un examen estandarizado | Dicotómico                    | 1= sí, 2= no                                                                                                                                              |
| 15 | ¿Cree usted que se un examen de conocimientos para la certificación de médicos generales en Colombia sería aceptado por el gremio?      | Percepción general de un examen estandarizado | Cinco puntos, respuesta única | 1. Extremadamente improbable, 2. Ligeramente improbable, 3. No es probable in improbable, 4. Ligeramente probable, 5. Extremadamente probable             |
| 16 | En su opinión, ¿Existe alguna forma de direccionamiento por parte del estado sobre la educación médica en Colombia?                     | Sistema Actual                                | Cinco puntos, respuesta única | 1. En lo absoluto, 2. ligeramente, 3. Moderadamente, 4. bastante, 5. extremadamente                                                                       |
| 17 | Al día de hoy, ¿Confiaría usted en un médico general para atender a sus familiares?                                                     | Percepción de médicos generales               | Cinco puntos, respuesta única | 1. En lo absoluto, 2. ligeramente, 3. Moderadamente, 4. bastante, 5. extremadamente                                                                       |
| 18 | ¿Cree usted que el rol de médico general en Colombia es transitorio?                                                                    | Percepción de médicos generales               | Cinco puntos, respuesta única | 1. En lo absoluto, 2. ligeramente, 3. Moderadamente, 4. bastante, 5. extremadamente                                                                       |
| 19 | ¿Que porcentaje de los problemas de salud de los Colombianos cree usted que es capaz de abordar satisfactoriamente un médico general?   | Percepción de médicos generales               | Escala continua               | Números enteros del 1 al 100                                                                                                                              |
| 20 | Califique la siguiente afirmación: "Los médicos generales son capaces de reoslver el 80% de las inquitudes en salud de los Colombianos" | Percepción de médicos generales               | Cinco puntos, respuesta única | 1. Extremadamente en desacuerdo, 2. Ligeramente en desacuerdo, 3. Ni en acuerdo ni en desacuerdo, 4. Ligeramente de acuerdo, 5. Extremadamente de acuerdo |
| 21 | ¿Su percepción sobre médicos generales cambiaría si fueran certificados por un proceso nacional estandarizado?                          | Percepción de médicos generales               | Cinco puntos, respuesta única | 1. En lo absoluto, 2. ligeramente, 3. Moderadamente, 4. bastante, 5. extremadamente                                                                       |

|             |                                                                                                                                                         |                                                          |                                               |                                                                                     |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------|-------------------------------------------------------------------------------------|
|             |                                                                                                                                                         |                                                          |                                               |                                                                                     |
| <b>22</b>   | ¿Cree usted que la actualización periódica de médicos generales es necesaria en Colombia?                                                               | Percepción de médicos generales                          | Dicotómica                                    | 1= Sí, 2= No                                                                        |
| <b>23</b>   | ¿Cree usted que un sistema de certificación nacional sería equitativo para estudiantes en diferentes regiones del país?                                 | Percepción general sobre la necesidad de estandarización | Cinco puntos, respuesta única                 | 1. En lo absoluto, 2. ligeramente, 3. Moderadamente, 4. bastante, 5. extremadamente |
| <b>24</b>   | ¿Qué tan relevante sería un examen estandarizado en el proceso formativo de los médicos generales?                                                      | Beneficio de proceso de certificación estandarizado      | Cinco puntos, respuesta única                 | 1. En lo absoluto, 2. ligeramente, 3. Moderadamente, 4. bastante, 5. extremadamente |
| <b>25</b>   | ¿Qué tan relevante serían herramientas educativas adicionales enfocadas hacia un examen estandarizado en el proceso formativo de los médicos generales? | Beneficio de proceso de certificación estandarizado      | Cinco puntos, respuesta única                 | 1. En lo absoluto, 2. ligeramente, 3. Moderadamente, 4. bastante, 5. extremadamente |
| <b>26 a</b> | ¿Podría un examen estandarizado para médicos generales mejorar la calidad de los graduados de medicina en Colombia?                                     | Beneficio de proceso de certificación estandarizado      | Cinco puntos, respuesta única, formato matriz | 1. En lo absoluto, 2. ligeramente, 3. Moderadamente, 4. bastante, 5. extremadamente |
| <b>26 b</b> | ¿Podría un examen estandarizado para médicos generales mejorar la calidad de la atención medicina en Colombia?                                          | Beneficio de proceso de certificación estandarizado      | Cinco puntos, respuesta única, formato matriz | 1. En lo absoluto, 2. ligeramente, 3. Moderadamente, 4. bastante, 5. extremadamente |

|             |                                                                                                                                                                     |                                                     |                                               |                                                                                                                                                            |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>26 c</b> | ¿Podría un examen estandarizado para médicos generales servir de acceso para posgrados?                                                                             | Beneficio de proceso de certificación estandarizado | Cinco puntos, respuesta única, formato matriz | 1. En lo absoluto, 2. ligeramente, 3. Moderadamente, 4. bastante, 5. extremadamente                                                                        |
| <b>27</b>   | ¿Cree usted que se requieren múltiples niveles de evaluación dependiendo del semestre en el que se encuentre el médico en formación? (Básicas, clínicas, internado) | Contenido y administración del examen               | Dicotómica                                    | Sí=1, No=2                                                                                                                                                 |
| <b>28</b>   | ¿Qué entidad cree que debe ser responsable de administrar un examen nacional estandarizado de conocimientos médicos en Colombia?                                    | Contenido y administración del examen               | Selección única de ítem                       | Ministry of health, ministry of education, National medical school's association, a new entity is required, Colombian Medical College, Universities, other |

*Appendix E: Survey Content Results*

| Question                                                                                                                                   | Likert Scale |          |            |       |           |  |
|--------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------|------------|-------|-----------|--|
|                                                                                                                                            | Percentage   |          |            |       |           |  |
|                                                                                                                                            | Not at all   | Slightly | Moderately | A lot | Extremely |  |
| <b>Do you agree with the following statement: “A medical knowledge test for general practitioner certification is needed in Colombia?”</b> | 1.25         | 3.75     | 11.25      | 22.5  | 56.25     |  |
| <b>Do you think a medical knowledge test for general practitioner certification would be accepted by doctors in Colombia?</b>              | 2.5          | 38.75    | 7.5        | 36.25 | 10        |  |
| <b>In your opinion, is there any degree of state direction over medical education in Colombia?</b>                                         | 26.25        | 28.75    | 22.5       | 12.5  | 3.75      |  |
| <b>To this date, would you trust a general practitioner (GP) to care</b>                                                                   | 8.75         | 12.5     | 51.25      | 20    | 2.5       |  |

|                                                                                                                                             |       |       |       |       |       |  |
|---------------------------------------------------------------------------------------------------------------------------------------------|-------|-------|-------|-------|-------|--|
| <b>for you or a family member?</b>                                                                                                          |       |       |       |       |       |  |
| <b>Do you believe that in Colombia the role of GP is transitory?</b>                                                                        | 21.25 | 15    | 28.75 | 18.75 | 11.25 |  |
| <b>To what extent do you agree with the following statement: "GPs are able to solve at least 80% of general population health inquires"</b> | 15    | 28.75 | 11.25 | 40    | 0     |  |
| <b>Would your perception of general practitioners change if they were certified by a national standardized medical knowledge exam?</b>      | 8.75  | 8.75  | 20    | 43.75 | 13.75 |  |
| <b>Do you think a periodic actualization for GPs is needed in Colombia?</b>                                                                 | 0     | 0     | 5     | 28.75 | 61.25 |  |
| <b>Do you believe a national certification system would be fair for students in different</b>                                               | 20    | 17.5  | 32.5  | 15    | 10    |  |

|                                                                                                                                      |      |      |       |       |       |  |
|--------------------------------------------------------------------------------------------------------------------------------------|------|------|-------|-------|-------|--|
| regions of the country?                                                                                                              |      |      |       |       |       |  |
| How relevant would a standardized exam be in the formation process of general practitioners in Colombia?                             | 1.25 | 5    | 11.25 | 42.5  | 35    |  |
| Could a national standardized examination for GPs increase the quality of Colombian medical graduates?                               | 3.75 | 6.25 | 8.75  | 52.5  | 23.75 |  |
| Could a national standardized examination for GPs increase the quality of healthcare delivery in Colombia?                           | 3.75 | 10   | 22.5  | 40    | 18.75 |  |
| Could a national standardized examination for GPs be used as an evaluation item when applying to postgraduate education? (Residency) | 1.25 | 8.75 | 17.5  | 36.25 | 31.25 |  |

|                                                                                                              | Ministry of Health | Minsitry of Education | ASCOFAME | Gremial Association | Univeristies | New entity |
|--------------------------------------------------------------------------------------------------------------|--------------------|-----------------------|----------|---------------------|--------------|------------|
| <b>Which entity should be responsible for implementing a national standardized medical exam in Colombia?</b> | 17.5               | 20                    | 35       | 2.5                 | 3.75         | 16.25      |