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# Implementation strategy for advanced practice nursing in Gabon: a multicenter mixed method study. Gabonese advanced practice nursing implementation

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# Gabonese advanced practice nursing implementation

## Title

**Implementation strategy for advanced practice nursing in Gabon: a multicenter mixed method study.**

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### **Authorship contribution :**

**JT:** Conceptualization, Methodology, Software, Validation, Formal analysis, Data Curation, Investigation, Writing- Original draft preparation, Writing - Review & Editing, Visualization, Funding acquisition. **EBN :** Conceptualization, Methodology, Validation, Formal analysis, Data Curation, Investigation, Writing- Original draft preparation, Writing - Review & Editing, Supervision. **SA:** Conceptualization, Methodology, Investigation, Supervision. **EI:** Investigation. **SMN:** Investigation. **PMP:** Conceptualization, Methodology, Validation, Formal analysis, Data Curation, Writing-Original draft preparation, Writing - Review & Editing, Visualization, Supervision. **PB :** Conceptualization, Methodology, Validation, Formal analysis, Data Curation, Writing-Original draft preparation, Writing - Review & Editing, Visualization, Supervision, Funding acquisition.

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### Abstract

**Aim:** To describe the expectations, acceptability, and challenges identified by nurses and key healthcare stakeholders regarding the implementation of advanced practice nursing in Gabon.

**Background:** Advanced practice nursing presents an opportunity to address the epidemiological transition and the shortage of healthcare professionals in Africa. In anticipation of establishing a master's degree program in advanced practice nursing and its subsequent implementation, it is important to understand Gabon's specific needs and characteristics.

**Design:** This study was a multicenter cross-sectional mixed method design.

**Methods:** From April to May 2022, a total of 187 healthcare professionals were included from two hospitals and two universities in Gabon. Data were collected through questionnaires and complemented by focus group discussions guided by the existing literature, the PEPPA framework and Hamric's model.

**Results:** The implementation of advanced practice nursing was generally well accepted. Factors influencing acceptability included being female, awareness of advanced practice nursing, and supporting the role of advanced practice nurses in diagnosing chronic diseases. Barriers to implementation included the absence of a legal framework for the profession and a lack of recognition of nursing skills by both nurses and doctors. Facilitators included the establishment of a master's degree program, formalization of a legal framework, raising awareness, providing training to medical doctors and other healthcare professionals about advanced practice nursing, and the development of nursing leadership.

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**Implications for Nursing:** Advanced practice nursing can play a crucial role in addressing healthcare resource shortages and the dual burden of chronic and infectious diseases in Gabon, as well as in other African countries.

**Implications for Nursing Policy:** To successfully implement advanced practice nursing in Gabon and in French-speaking Africa, it is essential to regulate the nursing and advanced nursing professions by creating a legal framework and establishing nursing councils. An effective implementation strategy for advanced practice nurses should be based on the specific needs of the country.

**Guidelines:** COREQ, STROBE

### **Keywords**

Advanced practice nursing implementation, Advanced practice nursing development, Africa, Chronic disease, Health policy, Implementation.

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### **INTRODUCTION**

Low- and middle-income countries in Africa face numerous challenges, including health and access to care (Ewen et al., 2017). These countries are currently grappling with a double burden caused by the epidemiological transition, which encompasses both infectious and non-communicable diseases, commonly referred to as chronic diseases (Omran, 2005; Remais et al., 2013). This transition occurs in the midst of ongoing socio-economic development, urbanization, and changing lifestyles characterized by sedentary behavior, increased junk food consumption, and tobacco and alcohol use (Haileamlak, 2018; Oni & Unwin, 2015). These changes have a significant impact on health outcomes, including mortality rates. Chronic diseases account for 41 million deaths annually, representing approximately 71% of global deaths, with three-quarters (31.4 million) occurring in low- and middle-income countries (Hay et al., 2017; World Health Organization, 2021). Consequently, in addition to existing health challenges such as epilepsy (Guinhouya et al., 2010), sickle cell disease (Buser et al., 2021), and infectious diseases, hypertension and diabetes mellitus (Roth et al., 2017) have emerged, further burdening already fragile healthcare systems (Ewen et al., 2017).

Addressing access to care and prevention of these chronic diseases, particularly in relation to modifiable risk factors, is crucial to alleviate the burden on both the population and healthcare systems. However, resources and healthcare workforce are scarce and limited in Africa (World Health Organization, 2016). For instance, the availability of medical doctors and nurses or midwives per 1000 people only accounts for 0.29 and 1.80 respectively in Sub-Saharan Africa (Haakenstad et al., 2022). Moreover, the ongoing COVID-

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19 pandemic has exacerbated healthcare shortages, potentially increasing the burden of chronic diseases in Africa (Owopetu et al., 2021).

As a potential solution to inequitable access to care in primary care settings, shortage of medical resources, and the increasing burden of chronic diseases, the implementation of advanced practice nursing (APN) has been explored in high-income countries (International Council of Nurses, 2020b). This concept was initially introduced in Canada and North America during the 1960s (Kaasalainen et al., 2010) and was more recently adopted by France in 2016 (Code de la santé publique, 2016). APN refers to "enhanced and expanded healthcare services and interventions provided by nurses who, in an advanced capacity, influence clinical healthcare outcomes and provide direct healthcare services to individuals, families, and communities" (Hamric et al., 2016; International Council of Nurses & Schober, 2020). Through additional education and training, advanced practice nurses acquire expert knowledge, complex decision-making skills, and clinical competencies to extend nursing practice (International Council of Nurses, 2020b). Clinical practice and direct care are the core competencies of advanced practice nurses, as outlined in Hamric's model, which also describes six additional generic skills for APN : consultation, evidence-based practice, leadership, collaboration, ethical decision-making, and guidance and coaching (Hamric et al., 2016). Existing evidence demonstrates the positive impact of APN on individuals, including enhanced therapeutic adherence, health literacy, quality of life, self-care skills, and improved management of glycemia and blood pressure (Morin, 2018). Internationally, the World Health Organization and the International Council of Nurses, in alignment with their commitments to universal health coverage by

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2030 (International Council of Nurses, 2020a; World Health Organization, 2023), have outlined objectives for the advancement of APN. These objectives encompass various aspects, including improving equity in access to healthcare, promoting a patient-centered approach that involves individuals, families, and communities, enhancing the quality of care through evidence-based practices, reducing costs for both users and healthcare systems through accountability and clinical leadership, and addressing the shortage of healthcare professionals by making the nursing profession more attractive (Delamaire & Lafortune, 2010; International Council of Nurses & Schober, 2020; Morin, 2018). These organizations, along with the *Secrétariat International des infirmières et des infirmiers de l'espace francophone*, recognize the importance of developing APN to meet these objectives (Morin, 2018).

Interest in APN has existed in Africa for a considerable time (Fulton & Holly, 2021). In the context of infectious disease, advanced practice nurses roles have already been developed and implemented in Botswana, Ghana, and Eswatini (Christmalls & Armstrong, 2019; Iwu & Holzemer, 2014). Moreover, in Gabon, nurses have expanded their roles to include prescription practices to address medical deserts, with acceptance from medical doctors, albeit in a non-legal manner. This initial acceptance of expanded nursing roles in Gabon could provide a favorable context for the implementation of APN. Although APN roles have been described in English-speaking African countries, such as South Africa, Kenya and Tanzania, they do not fully meet the complete role specifications of APN (Christmalls & Armstrong, 2019; Hassmiller & Pulcini, 2020; Kimani & Ndirangu-Mugo, 2023; Trinitas & Blood-Siegfried, 2023). For



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example, even though Kenya has launched its master's level APN program, there is still more work to be done to fully recognize the roles of advanced practice nurses and nurse practitioners, particularly in terms of formalizing prescription rights and institutionalizing their roles (Kimani & Ndirangu-Mugo, 2023). Implementation models, such as the PEPPA framework (Bryant-Lukosius & DiCenso, 2004), have been used to guide the implementation of APN and adapt their roles to meet real needs (Aguilard et al., 2017). The PEPPA framework, recognized and recommended by the International Council of Nurses, aims to overcome barriers, and understand the role and environment of advanced practice nurses. For example, it has been implemented in Eswatini and South Africa for the implementation of family nurse practitioners (Dlamini et al., 2020). Although collaboration between South and North countries is valuable for implementing and developing APN in Africa, it is crucial to ensure that implementation models are context-specific and tailored to the needs and challenges faced by healthcare providers and the population in each country (Christmalls & Armstrong, 2019; Kolars et al., 2012).

Given the aforementioned context, integrating APN into Africa could be favorable. In addition to freeing up medical time, advanced practice nurses offer innovative care pathways and expanded territorial health coverage in a cost-effective manner (Abraham et al., 2019). For this reason, Gabon is considering the implementation of APN and has recently opened a master's degree program in APN at the Faculty of Midwifery and Nursing Science of Libreville in collaboration with Limoges University in France, starting in October 2023.

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There is limited literature describing implementation models (Dlamini et al., 2020; East et al., 2014), no study has simultaneously assessed the needs, expectations, and challenges related to the implementation of APN among different healthcare providers, such as nurses, medical doctors, and nursing students, in Africa, particularly in French-speaking Africa and Gabon where APN is not yet well-known and recognized.

Therefore, we aimed to describe the expectations, acceptability, and challenges identified by nurses and key healthcare stakeholders regarding the implementation of APN in Gabon. The secondary objectives were to explore the perceptions, implementation possibilities, facilitators, and barriers associated with the implementation of APN in Gabon.

### **METHODS**

#### **Study design and participants:**

We conducted an exploratory multicenter cross-sectional convergent mixed method study (Creswell & Plano Clark, 2011). Qualitative data were used to interpret and complement the results of the quantitative analysis (Östlund et al., 2011). To design and report this study, we followed international guidelines for mixed-method, qualitative (COREQ), and quantitative (STROBE) (Fetters & Freshwater, 2015; O'Brien et al., 2014; Tong et al., 2007; Von Elm et al., 2007).

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Data were collected in Gabon from April to May 2022 at the Akanda Cancer Institute, the Mother and Child University Hospital Center of Jeanne Ebori Foundation, the Faculty of Nursing Science and Midwifery of Libreville, and at EM-Gabon University.

The study included all nurses, medical doctors, and nursing students who agreed to participate and were present at the time of data collection at the mentioned locations. Nursing students were included because they were directly concerned with the possibility of continuing in the APN master's degree.

Data were collected from two sources, a questionnaire followed by focus groups.

### **Quantitative data collection and analyzes:**

All participants answered a questionnaire that included sociodemographic and professional data, perceptions of nursing profession evolution possibilities, skills, related impacts on the health system, and knowledge of APN, as well as facilitators and barriers for implementation. The questionnaire was based on the PEPPA Framework's major topics (Bryant-Lukosius and DiCenso, 2004) and literature (Hamric et al., 2016; Schwingrouber et al., 2021). Before implementation, the questionnaire was tested by two doctors and five nurses to ensure comprehensibility and readability, and no modification were necessary.

Statistical analyzes were performed using SPSS® V22.0. Results were presented by profession. Quantitative variables were described using mean

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and standard deviation or median and interquartile range and compared using ANOVA or Kruskal-Wallis test as appropriate. Categorical variables were described using numbers and percentages and compared using  $\chi^2$  test or Fisher's test as appropriate. A p-value  $<0.05$  was considered statistically significant.

To assess the acceptability of APN implementation, an acceptability binary variable was created. Acceptability was considered positive if participants answered "yes" to more than 8 out of 10 items describing APN skills, following the Hamric model (Hamric et al., 2016). The "8" cut-off was chosen as it was the median of the acceptability score. To identify the independent determinants of acceptability, a stepwise backward multivariate logistic regression was performed, including variables with an association p-value for acceptability  $< 0.25$ , with attention to avoid collinearity between the variables.

### **Qualitative data collection and analyzes:**

From the included participants, volunteers of all professions were involved in focus groups. Five focus groups were performed ranging from 9 to 12 health carers or students. Homogeneous and heterogeneous focus groups were conducted to reach saturation and exhaustivity of viewpoints (Drapeau, 2004). The focus groups were led by two experienced researchers in qualitative research (JT and EBN) who were not acquainted with the participants. A structured interview guide based on the literature (Bryant-Lukosius and DiCenso, 2004; Hamric et al., 2016; Schwingrouber et al., 2021) and previously tested for comprehensibility, guided the focus group sessions.

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The questions asked were "What are the main barriers of the health system for the nursing profession?", "What do you think about the nurses' role evolution?", "What are the keys to a good evolution of the nursing profession?", "What are the barriers linked to this evolution?". The focus groups were fully recorded (4 h and 38 min) and transcribed. Anonymization (Code: DR= medical doctors, ESI= nursing students, IDE= nurses) was carried out, and thematic analysis (Tuckett, 2005) using NVivo 12.0® was performed independently by two researchers. A triangulation process was conducted (Carter et al., 2014), and the coding researchers (JT, EBN and PB) held regular meetings throughout the analysis process to discuss any codes (both a priori and emerging). Ultimately, all researchers approved and discussed the codes and analyzes.

### **Ethical approval and authorization.**

All participants provided written informed consent, and the Gabonese Ministry of Health and directors of all involved structures granted authorization for data collection among participants. Ethical approval was obtained from the ethics committee of the Limoges University Hospital Centre (n°577-2022-233).

## **RESULTS**

### ***Sample characteristics:***

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Of 187 carers included in our study, 42 were nurses, 24 were medical doctors, and 121 were nursing students. Table 1 provides the sample characteristics. Appendix 1 presents the results of the thematic analysis, the main themes that guided the writing of the results section. Selected quotes from the data are included throughout the findings section to illustrate the sub-themes and codes.

### ***Acceptability of APN implementation:***

Main APN skills were described for some chronic diseases in the questionnaire and are presented in Appendix 2, percentage and comparisons between groups are available in Appendix 3. Additionally, in open-ended questions, participants identified common affections like malaria (n=61), HIV and other sexually transmitted infections (n=27), tuberculosis and pulmonary infection (n=24), and gastrointestinal symptoms (n=22) to the list of diseases that an advanced practice nurse could treat. This was also cited in the qualitative analysis "Nurses know how to diagnose and treat malaria, they don't need a doctor for this" ME-IDE2. Medical doctors were also in agreement with the expansion of nurses' roles through APN implementation, "If they are trained, they can diagnose and treat" AK-DR1.

The percentages of acceptance of APN skills by profession are presented in table 2. Participants 69.5% globally think that APN could improve chronic disease care without a statistically significant difference between professions (p=0.294). They identified home care and follow-up by advanced practice nurses as other important skills to develop, "we need home care to improve the

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quality of care, especially regarding wound monitoring as an example" ME-IDE3.

The planned exercise location of advanced practice nurses was also investigated with a statistically significant difference between professions for hospital and rural practice. Hospital practice remained the more favorable planned place with 85.6% of acceptance globally (n=160), 90.5% of nurses (n=38), 62.5% of medical doctors (n=15), and 88.4% of nursing students (n=107) (p=0.006). It was followed by rural practice with 82.9% of global acceptance (n=155), 90.5% of nurses (n=38), 95.8% of medical doctors (n=23), and 77.7% of nursing students (n=94) (p=0.039). Town exercise was globally accepted by 50.3% of participants (n=94) without a statistically significant difference between professions (p=0.239). The topic of exercise location was an important discussion in the focus groups. Nurses felt they do "as a doctor" ME-IDE6 in rural areas but the "population paid the price because nurses are actually not well trained in extended competencies" AK-DR3. Regarding hospital care, nurses felt devalued due to limitations induced by medical doctors "they don't allow us to do what we can do" ME-IDE5. Moreover, they felt under-recognized within their competencies "we can't use nursing diagnoses because they are not valuable for medical doctors" ME-IDE2. However, it was clearly expressed that "advanced practice nurses need to be everywhere" AK-IDE4, "in rural, town and hospital care settings" AK-DR3.

The results of the logistic regression performed to identify associated factors with acceptability are available in Appendix 4. In the univariate analysis, we

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found that awareness of APN existence and being in favor of the possibility of diagnosing chronic diseases for advanced practice nurses were positively associated factors for APN implementation. In the multivariate analysis, we still found the same acceptability-associated factors plus the fact of being a woman.

### ***Representations linked to APN implementation:***

“Advanced practice nursing” term and role were relatively well known with 61% of participants knowing it (n=114). There was a statistically significant difference between professions ( $p < 0.001$ ), with nursing students (71.9%) and nurses (47.6%) being more aware than medical doctors (29.2%).

Globally, 84% (n=157) of participants believed that advanced practice nurses could be a mainstay of chronic disease management, with 100.0% of nurses (n=42), 100.0% of medical doctors (n=23), and 93.4% of nursing students (n=103) believing so, without a statistically significant difference between professions ( $p = 0.142$ ). However, we found a statistically significant difference in the fact that advanced practice nurses could diagnose chronic diseases ( $p = 0.030$ ) and prescribe medications ( $p = 0.044$ ). Specifically, 78.1% of all participants (n=146) thought that nurses could diagnose chronic diseases. This belief was held by 85.7% of nurses (n=36), 58.3% of medical doctors (n=14), and 79.3% of nursing students (n=96) within the participant group. For the prescription, it was 84.0% (n=157) globally and 90.5% (n=38), 66.7% (n=16), and 85.1% (n=103) respectively.

### ***Perceived interests in APN implementation:***



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Perceived interests in the APN implementation are described in table 3.

Some interests regarding the evolution of the nursing profession were also described in the focus groups. The "nursing profession's evolution is necessary" US-ESI4, nurses need to be "trained by their peers, now it's done by medical doctors, and we don't focus on nursing area" US-ESI8. A Master's degree was the first step identified before Ph.D. to develop a "nursing teaching staff" US-ESI3 and improve the nursing profession and nursing care quality.

Moreover, it was identified that advanced practice nurses were not like doctors, they had to extend their competencies in the clinical area but in a nursing view "nursing role is not only based on medicine, but nurses also have a bigger place to play [...] advanced practice nurses don't come to substitute to doctors" EM-ESI6. As an example, "we have to spend time with the patient, educate him [...] it's global" ME-IDE5.

### ***Barriers and facilitators linked to APN implementation:***

Both the risk of division and under-recognition were identified in both qualitative and quantitative analyses.

Cleavage was a risk for 37.4% globally (n=70), 40.5% for nurses (n=17), 45.8% for medical doctors (n=11), and 34.7% for nursing students (n=42) with no statistically significant difference between professions (p=0.532). It was explained by different factors. The bad consideration of the nursing profession "medical doctors underestimate us" US-ESI2, "we have the impression that nurses are executors, i.e. they just perform the doctors' orders and that's it" ME-

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IDE1. A major topic in focus groups: the legal context of the nursing profession. Indeed, they "don't have legal status or council of nurses" ME-IDE8. Logically, under-recognition of advanced practice nurses' skills was a risk for 22.5% globally (n=42), 38.1% for nurses (n=16), 20.8% for medical doctors (n=5), and 17.4% for nursing students (n=21) with a statistically significant difference between professions (p=0.021). The under-recognition risk was higher for nurses, which could be explained by elements cited above but also linked to low leadership skills "if they don't have what we call leadership if they don't know how to defend their interests if they don't have the arguments they will never be valued" ME-IDE8. There was also resistance to change: "our moms who are nurses right now, they already have a way of working and don't understand why a new nurse wants to change practice" EM-ESI2.

Leadership was identified as a facilitator for APN implementation. Other factors like the master's degree "the basis of everything is training. If nurses are trained, there will be confidence" AK-DR4 and sensibilizations of health carers were important for acceptability regarding medical doctors, "it is necessary to make doctors understand what advanced practice nursing is, what are their roles" ME-IDE7. The major facilitator identified was the formalization of a legal context, which described precisely what advanced practice nurses were allowed or not to do, "We need a legal context for nurses and advanced practice nurse roles" ME-IDE12. Finally, the last barrier identified by medical doctors was the risk of "overstepping their role" AK-DR4 if they were not clearly defined.

## **DISCUSSION**

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This study represents the first mixed-method study focusing on the expectations, acceptability, and challenges of APN implementation in French-speaking African country. We found that 58.8% of health carers were favorable to the implementation of APN. Notably, APN role was relatively well known among the participants. Our findings suggest that there is a need and potential for APN in various settings in Gabon, including rural, hospital, and town areas. Factors influencing acceptability included sex, awareness of the existence of advanced practice nursing, and support for the possibility of advanced practice nurses diagnosing chronic diseases.

Barriers to implementation centered on the lack of a professional legal context and underrecognition of nursing and advanced practice nursing skills by both nurses and medical doctors. The resistance to change also emerged as a significant obstacle. On the other hand, facilitators identified in our study included the master's degree in APN, the formalization of a legal context, and the sensitization and training of medical doctors and other health carers to understand the concept of APN. Additionally, the importance of leadership in nursing independence and role clarification has been emphasized.

Our study's larger sample size allowed for a more comprehensive view compared to other investigations on this topic. (Dlamini et al., 2020; East et al., 2014; Schwingrouber et al., 2021). Employing a mixed methodology, we were able to gain valuable insights into the specific needs and challenges faced by health carers in relation to the implementation of APN in Gabon. This understanding is crucial for the successful implementation of APN (Christmalls and Armstrong, 2019; Kolars et al., 2012).

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The overall acceptance of APN by medical doctors, nurses, and nursing students is promising, particularly in comparison to other contexts in which medical doctors have expressed reservations (Kleinpell et al., 2014; Kolars et al., 2012; Pulcini et al., 2010). The representations found in our study align with the expected outcomes, indicating that the implementation of APN has the potential to improve access to care and enhance the health system in Gabon, as previously demonstrated in the literature (Htay & Whitehead, 2021; Woo et al., 2017).

The barriers and facilitators identified were also found in recent literature (Christmals & Armstrong, 2019; Torrens et al., 2020). Recognizing these factors will enable Gabonese authorities to devise effective strategies for the successful implementation of APN. Notably, the absence of a legislative framework and Nursing Council in Gabon emerged as the main barriers. This lack of effective nursing regulation has also been observed in other African countries (Christmals and Armstrong, 2019), and has resulted in a 13-year delay in the recognition of advanced practice nurses in Ghana (Hassmiller and Pulcini, 2020). Moreover, Gabonese medical doctors identified the creation of a legislative framework as a facilitator of acceptability for APN. Establishing a legislative framework will help to clarify the role of advanced practice nurses and reduce ambiguities and role confusion (Duma et al., 2014). Role confusion was an obstacle for medical doctors who were afraid of the risks encountered by patients.

Our study also highlighted the importance of specific training for advanced practice nurses. The requirements for a master's degree and higher education

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are associated with greater patient safety (Aiken et al., 2014). Furthermore, the quality of care provided by advanced practice nurses has been shown to be equal to, if not better than, that provided by general practitioners (Chou et al., 2021; Htay & Whitehead, 2021; Swan et al., 2015).

The prospect of implementing APN following Hamric's model competencies appears promising in Gabon (Hamric et al., 2016). All competencies were well-accepted, except for "peer formation," which had a lower acceptance rate, particularly among nurses and nursing students. This discrepancy may be attributed to the fact that nurses in Gabon were mainly trained by medical doctors. Developing nursing teaching staff, as emphasized in our focus groups, could elevate the nursing profession and foster further positive development in the field (Christmalls and Armstrong, 2019).

Facing chronic disease in the context of the epidemiological transition is a major issue for African countries (Oni & Unwin, 2015; Remais et al., 2013); therefore, acceptability of APN regarding the management of chronic disease was evaluated. While our study focuses on chronic disease management within the context of the epidemiological transition, the significance of infectious diseases should not be underestimated. Our participants highlighted the importance of addressing infectious diseases, such as malaria and sexually transmitted infections, which warrant attention from advanced practice nurses. As such, we intend to incorporate an infectious disease module into the APN curriculum in Gabon. This exemplifies the need for a specific and tailored program for APN,

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rather than merely transferring models from one country to another (Christmals & Armstrong, 2019).

Our study had some limitations. First, the study focused exclusively on one French-speaking African country, potentially limiting the generalizability of our findings. Second, we did not assess the population's acceptance of APN. Even if the literature showed positive acceptance of APN by the population (Tracy et al., 2022), the newness of the concept could be complex to accept in the Gabonese context. Third, we did not gather inputs from rural nurses and stakeholders, whose perspectives may reveal additional specific needs. Fourth, our study did not involve political stakeholders; however, it received support from the Ministry of Health in Gabon. Lastly, due to mixed methodology and focus group use, we cannot rule out desirability bias even though careful attention was paid to prevent it ; as an example, participants were exclusively voluntary and were not paid for their participation.

However, our study also had several strengths. The large and exhaustive sample combined with a multicentric and mixed-method design contributes to the robustness of our results. Moreover, to our knowledge this is the first mixed-method study on the topic conducted in Africa, providing concrete information to design the implementation of APN and guide specific training curricula.

### **Recommendations for further research**

Further research should focus on the specificity of rural nurses and stakeholders to understand their specific needs. Furthermore, studies

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assessing patient outcomes related to APN care are warranted. Additionally, investigations into patient acceptance of APN are needed.

### **Conclusion**

In conclusion, conducting a pre-implementation study of APN in Gabon was essential. This allowed us to delineate the needs and expectations of key stakeholders, design a specific curriculum, and prepare for successful implementation considering the identified facilitators and barriers.

### **Implications for Nursing & Health Policy**

APN is poised to play a critical role in Gabon and across Africa in addressing the shortage of health care resources and the challenges of managing chronic and infectious diseases. Establishing a regulatory framework for nursing and the APN profession, including the creation of a legal framework and nursing councils, are essential steps in implementing APN in Africa. Ensuring the effective implementation of APN requires careful preparation tailored to the specific needs of each country.

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Table 1: Sample characteristics

| Variables                         | Global<br>(n = 187 ) | Nurses<br>(n = 42) | Medical Doctors<br>(n = 24) | Nursing<br>students<br>(n=121) | p-value          |
|-----------------------------------|----------------------|--------------------|-----------------------------|--------------------------------|------------------|
| Sex (female)                      | 147<br>(78.6%)       | 33 (78.6%)         | 17 (70.8%)                  | 97 (80.2%)                     | 0.622            |
| Age (years)                       | 28.0 [8]             | 39.5 [14]          | 38.0 [18]                   | 26.0 [4]                       | <b>&lt;0.001</b> |
| Work place:                       |                      |                    |                             |                                |                  |
| <input type="checkbox"/> Hospital | 183<br>(97.9%)       | 42<br>(100.0%)     | 20 (83.3%)                  | 121<br>(100.0%)                | <b>&lt;0.001</b> |
| <input type="checkbox"/> City     | 7 (9.0%)             | 0 (0.0%)           | 7 (26.1%)                   | 0 (0.0%)                       | <b>&lt;0.001</b> |
| Experience<br>(years)             | 0.0 [4]              | 8.0 [12]           | 8.5 [13]                    | 0.0 [0]                        | <b>&lt;0.001</b> |
| Year of studies                   |                      |                    |                             |                                |                  |
| <input type="checkbox"/> Second   |                      |                    |                             | 3 (2.5%)                       |                  |
| <input type="checkbox"/> Third    |                      |                    |                             | 118<br>(97.5%)                 |                  |

Number (percentage)

Median [interquartile range]

## Gabonese advanced practice nursing implementation

Table 2: Percentage of participant acceptance of advanced nursing's skills by profession

| Variables                         | Global<br>(n = 187 ) | Nurses<br>(n = 42) | Medical<br>Doctors<br>(n = 24) | Nursing<br>students<br>(n=121) | p-value      |
|-----------------------------------|----------------------|--------------------|--------------------------------|--------------------------------|--------------|
| Do patient follow up              | 179 (95.7%)          | 41 (97.6%)         | 21 (87.5%)                     | 117 (96.7%)                    | 0.090        |
| Do peer formation                 | 88 (47.1%)           | 19 (45.2%)         | 19 (79.2%)                     | 50 (41.3%)                     | <b>0.003</b> |
| Do consultation                   | 125 (66.8%)          | 30 (71.4%)         | 14 (58.3%)                     | 81 (66.9%)                     | 0.575        |
| Conduct research                  | 139 (74.3%)          | 35 (83.3%)         | 16 (66.7%)                     | 88 (72.7%)                     | 0.266        |
| Do a patient clinical examination | 114 (61.0%)          | 27 (64.3%)         | 10 (41.7%)                     | 77 (63.6%)                     | 0.119        |
| Care pathway coordination         | 151 (80.7%)          | 34 (81.0%)         | 22 (97.7%)                     | 95 (78.5%)                     | 0.346        |
| Make prevention                   | 148 (79.1%)          | 34 (81.0%)         | 22 (91.7%)                     | 92 (76.0%)                     | 0.217        |
| Do Therapeutic education          | 156 (83.4%)          | 30 (71.4%)         | 20 (83.3%)                     | 106 (87.6%)                    | 0.058        |
| Global acceptability score        | 110 (58.8%)          | 29 (69.0%)         | 13 (54.2%)                     | 68 (56.2%)                     | 0.302        |

## Gabonese advanced practice nursing implementation

Table 3: Perceived interests in advanced practice nurses' implementation

| Variables   | Global<br>(n = 187 ) | Nurses<br>(n = 42) | Medical<br>Doctors<br>(n = 24) | Nursing<br>students<br>(n=121) | p-value      |
|---|----------------------|--------------------|--------------------------------|--------------------------------|--------------|
| <u>Regarding the nursing profession:</u>  |                      |                    |                                |                                |              |
| <input type="checkbox"/> Could valorize nursing                                 | 179 (95.7%)          | 40 (95.2%)         | 24 (100.0%)                    | 115 (95.0%)                    | 0.749        |
| <input type="checkbox"/> Could retain nurses                                    | 150 (80.2%)          | 39 (92.9%)         | 20 (83.3%)                     | 91 (75.2%)                     | <b>0.035</b> |
| <input type="checkbox"/> Could legalize existing practices                      | 159 (85.0%)          | 37 (88.1%)         | 23 (95.8%)                     | 99 (81.8%)                     | 0.189        |
| <u>Regarding the health system:</u>   |                      |                    |                                |                                |              |
| <input type="checkbox"/> Could improve the healthcare system                    | 183 (97.9%)          | 42 (100.0%)        | 23 (95.8%)                     | 118 (97.5%)                    | 0.434        |
| <input type="checkbox"/> Could improve patient outcomes                         | 180 (96.3%)          | 42 (100.0%)        | 24 (100.0%)                    | 114 (94.2%)                    | 0.192        |
| <input type="checkbox"/> Could increase the time with the patient               | 150 (80.2%)          | 39 (92.9%)         | 19 (79.2%)                     | 92 (76.0%)                     | <b>0.043</b> |
| <input type="checkbox"/> Could improve care pathway                             | 180 (96.3%)          | 41 (97.6%)         | 24 (100.0%)                    | 115 (95.0%)                    | 0.614        |
| <input type="checkbox"/> Could decrease inappropriate use of emergency services | 167 (89.3%)          | 39 (92.9%)         | 21 (87.5%)                     | 107 (88.4%)                    | 0.773        |
| <input type="checkbox"/> Could decrease the hospitalization rate                | 127 (67.9%)          | 37 (88.1%)         | 18 (75.0%)                     | 72 (59.5%)                     | <b>0.002</b> |

## Gabonese advanced practice nursing implementation

|   |             |             |             |             |              |
|---|-------------|-------------|-------------|-------------|--------------|
| <input type="checkbox"/> Could improve town-hospital coordination of care   | 167 (89.3%) | 40 (95.2%)  | 23 (95.8%)  | 104 (86.0%) | 0.303        |
| <input type="checkbox"/> Could decrease medical desert                      | 173 (92.5%) | 41 (97.6%)  | 23 (95.8%)  | 109 (90.1%) | 0.268        |
| <input type="checkbox"/> Could decrease appointment times                   | 165 (88.2%) | 39 (92.9%)  | 24 (100.0%) | 102 (84.3%) | <b>0.043</b> |
| <u>Regarding care quality:</u>  |             |             |             |             |              |
| <input type="checkbox"/> Could increase evidence-based practice             | 174 (93.0%) | 40 (95.2%)  | 23 (95.8%)  | 111 (91.7%) | 0.759        |
| <input type="checkbox"/> Could favor the relationship between nursing staff | 183 (97,9%) | 42 (100.0%) | 24 (100%)   | 117 (96,7%) | 0.755        |
| <input type="checkbox"/> Could be a resource for medical doctors            | 180 (96.3%) | 40 (95.2%)  | 24 (100%)   | 116 (95.9%) | 0.735        |

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Number (percentage)

## Gabonese advanced practice nursing implementation

### Appendix 1 : Thematic analysis

| Main theme   | Sub-theme  | Codes   |
|--|--|---|
| <i>Actual nursing role</i>   | Expanded nurse's role in rural area                                      | Prescription<br>Diagnosis<br>Medical role   |
|  | Risks with actual expanded nurses' role                                  | Non-controlled task-shifting<br>Training  |
|  | Under-recognition of nurses' role  | Prescribed care<br>Nursing diagnosis<br>Nursing leadership  |
| <i>Perceived interests in advanced practice nursing implementation</i>       | Mainstay of chronic disease care   | Diagnosis<br>Follow up<br>Home care   |
|  | Infectious diseases care   | Diagnosis<br>Treatment<br>Local care  |
|  | Development of nursing   | Necessity<br>Nursing care quality<br>Nursing teaching staff<br>Nursing curricula                      |
| <i>Acceptability of advanced practice nursing implementation</i>             | Advanced practice nursing exercise location                              | Rural   |
|  |  | Town  |
|  |  | Everywhere  |
| <i>Facilitators and Barriers of advanced practice nursing implementation</i> | Knowledge of advanced practice nursing (for nurses and nursing students) | Specificity of advanced practice nursing  |
|  |  | Experience from other countries   |
|  | Knowledge of advanced practice nursing (for doctors)                     | Partial awareness<br>Convenient view<br>Experience from other countries                               |
| <i>Facilitators and Barriers of advanced practice nursing implementation</i> | Training   | Master's degree<br>Importance of academic course<br>Doctor's training among advanced practice nursing |
|  | Policy   | Advanced practice nursing<br>Legislative framework<br>Nursing Council                                 |
|  | Leadership   | Nursing independence<br>Nursing role clarification  |
|  | Cleavage risk  | Nurse to Nurse<br>Doctor to Nurse   |
|  | Overstepping   | Building trust  |
|  |  | Nursing regulation  |

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Under-recognition risk

Nurse to Nurse  
Doctor to Nurse

Appendix 3 : Percentage of evolution's acceptability of the nursing profession regarding different skills by chronic disease

| Variables                             | Global<br>(n = 187 ) | Nurses<br>(n = 42) | Medical<br>Doctors<br>(n = 24) | Nursing<br>students<br>(n=121) | p-value          |
|---------------------------------------|----------------------|--------------------|--------------------------------|--------------------------------|------------------|
| <b>Diabetes :</b>                     |                      |                    |                                |                                |                  |
| <input type="checkbox"/> Prevention   | 173 (92.5%)          | 38 (90.5%)         | 23 (95.8%)                     | 112 (92.6%)                    | 0.841            |
| <input type="checkbox"/> Screening    | 145 (77.5%)          | 33 (78.6%)         | 24 (100%)                      | 88 (72.7%)                     | <b>0.014</b>     |
| <input type="checkbox"/> Diagnostic   | 92 (49.2%)           | 19 (45.2%)         | 18 (75.0%)                     | 55 (45.5%)                     | <b>0.026</b>     |
| <input type="checkbox"/> Treatment    | 81 (43.3%)           | 19 (45.2%)         | 5 (20.8%)                      | 57 (47.1%)                     | 0.058            |
| <input type="checkbox"/> Surveillance | 181 (96.8%)          | 39 (92.9%)         | 24 (100%)                      | 118 (97.5%)                    | 0.231            |
| <b>Breast Cancer :</b>                |                      |                    |                                |                                |                  |
| <input type="checkbox"/> Prevention   | 175 (93.6%)          | 38 (90.5%)         | 23 (95.8%)                     | 114 (94.2%)                    | 0.664            |
| <input type="checkbox"/> Screening    | 160 (85.6%)          | 34 (81.0%)         | 19 (79.2%)                     | 107 (88.4%)                    | 0.262            |
| <input type="checkbox"/> Diagnostic   | 81 (43.3%)           | 17 (40.5%)         | 2 (8.3%)                       | 62 (51.2%)                     | <b>&lt;0.001</b> |
| <input type="checkbox"/> Treatment    | 61 (32.6%)           | 10 (23.8%)         | 0 (0.0%)                       | 51 (42.1%)                     | <b>&lt;0.001</b> |
| <input type="checkbox"/> Surveillance | 167 (89.3%)          | 38 (90.5%)         | 20 (83.3%)                     | 109 (90.1%)                    | 0.565            |
| <b>Cervical Cancer :</b>              |                      |                    |                                |                                |                  |
| <input type="checkbox"/> Prevention   | 168 (89.8%)          | 35 (83.3%)         | 23 (95.8%)                     | 110 (90.9%)                    | 0.271            |
| <input type="checkbox"/> Screening    | 143 (76.5%)          | 29 (69.0%)         | 18 (75.0%)                     | 86 (79.3%)                     | 0.399            |
| <input type="checkbox"/> Diagnostic   | 70 (37.4%)           | 16 (38.1%)         | 2 (8.3%)                       | 52 (43.0%)                     | <b>0.005</b>     |
| <input type="checkbox"/> Treatment    | 54 (28.9%)           | 8 (19.0%)          | 0 (0.0%)                       | 46 (38.0%)                     | <b>&lt;0.001</b> |
| <input type="checkbox"/> Surveillance | 159 (85.0%)          | 38 (90.5%)         | 18 (75.0%)                     | 103 (85.1%)                    | 0.234            |
| <b>Prostate Cancer:</b>               |                      |                    |                                |                                |                  |
| <input type="checkbox"/> - Prevention | 165 (88.2%)          | 36 (85.7%)         | 20 (83.3%)                     | 109 (90.1%)                    | 0.441            |
| <input type="checkbox"/> Screening    | 140 (74.9%)          | 26 (61.9%)         | 18 (75.0%)                     | 96 (79.3%)                     | 0.089            |
| <input type="checkbox"/> Diagnostic   | 75 (40.1%)           | 16 (38.1%)         | 3 (12.5%)                      | 56 (46.3%)                     | <b>0.007</b>     |
| <input type="checkbox"/> Treatment    | 57 (30.5%)           | 10 (23.8%)         | 0 (0.0%)                       | 47 (38.8%)                     | <b>&lt;0.001</b> |

## Gabonese advanced practice nursing implementation

|                          |              |             |            |            |             |              |
|--------------------------|--------------|-------------|------------|------------|-------------|--------------|
| <input type="checkbox"/> | Surveillance | 163 (87.2%) | 40 (95.2%) | 17 (70.8%) | 106 (87.6%) | <b>0.020</b> |
| Epilepsy:                |              |             |            |            |             |              |
| -                        | Prevention   | 116 (62.0%) | 26 (61.9%) | 16 (66.7%) | 74 (61.2%)  | 0.879        |
| <input type="checkbox"/> | Screening    | 95 (50.8%)  | 23 (54.8%) | 13 (54.2%) | 59 (48.8%)  | 0.782        |
| <input type="checkbox"/> | Diagnostic   | 76 (40.6%)  | 19 (45.2%) | 7 (29.2%)  | 50 (41.3%)  | 0.441        |
| <input type="checkbox"/> | Treatment    | 78 (41.7%)  | 12 (28.6%) | 4 (16.7%)  | 62 (51.2%)  | <b>0.001</b> |
| <input type="checkbox"/> | Surveillance | 169 (90.4%) | 38 (90.5%) | 19 (79.2%) | 112 (92.6%) | 0.133        |
| Stroke:                  |              |             |            |            |             |              |
| -                        | Prevention   | 154 (82.4%) | 37 (88.1%) | 23 (95.8%) | 94 (77.7%)  | 0.055        |
| <input type="checkbox"/> | Screening    | 87 (46.5%)  | 21 (50.0%) | 14 (58.3%) | 52 (43.0%)  | 0.345        |
| <input type="checkbox"/> | Diagnostic   | 82 (43.9%)  | 18 (42.9%) | 7 (29.2%)  | 57 (47.1%)  | 0.260        |
| <input type="checkbox"/> | Treatment    | 76 (40.6%)  | 12 (28.6%) | 4 (16.9%)  | 60 (49.6%)  | <b>0.002</b> |
| <input type="checkbox"/> | Surveillance | 172 (92.0%) | 38 (90.5%) | 22 (91.7%) | 112 (92.6%) | 0.853        |
| Heart attack:            |              |             |            |            |             |              |
| -                        | Prevention   | 132 (70.6%) | 33 (78.6%) | 22 (91.7%) | 77 (63.6%)  | <b>0.009</b> |
| <input type="checkbox"/> | Screening    | 68 (36.4%)  | 18 (48.9%) | 15 (62.5%) | 35 (28.9%)  | <b>0.004</b> |
| <input type="checkbox"/> | Diagnostic   | 62 (33.2%)  | 15 (35.7%) | 5 (20.8%)  | 42 (34.7%)  | 0.401        |
| <input type="checkbox"/> | Treatment    | 72 (38.5%)  | 12 (28.6%) | 4 (16.7%)  | 56 (46.3%)  | <b>0.007</b> |
| <input type="checkbox"/> | Surveillance | 166 (88.8%) | 39 (92.9%) | 18 (75.0%) | 109 (90.1%) | 0.089        |
| High Blood Pressure:     |              |             |            |            |             |              |
| -                        | Prevention   | 172 (92.0%) | 38 (90.5%) | 24 (100%)  | 110 (90.9%) | 0.394        |
| <input type="checkbox"/> | Screening    | 128 (68.4%) | 30 (71.4%) | 24 (100%)  | 74 (61.2%)  | <b>0.001</b> |
| <input type="checkbox"/> | Diagnostic   | 114 (61.0%) | 24 (57.1%) | 12 (50.0%) | 78 (64.5%)  | 0.363        |
| <input type="checkbox"/> | Treatment    | 109 (58.3%) | 21 (50.0%) | 8 (33.3%)  | 80 (66.1%)  | <b>0.005</b> |
| <input type="checkbox"/> | Surveillance | 178 (95.2%) | 39 (92.9%) | 21 (87.5%) | 118 (97.5%) | <b>0.047</b> |
| Chronic heart failure    |              |             |            |            |             |              |
| <input type="checkbox"/> | Prevention   | 129 (69.0%) | 30 (71.4%) | 19 (79.2%) | 80 (66.1%)  | 0.398        |
| <input type="checkbox"/> | Screening    | 81 (43.3%)  | 17 (40.5%) | 13 (54.2%) | 51 (42.1%)  | 0.497        |



## Gabonese advanced practice nursing implementation

|                                       |             |            |            |             |              |
|---------------------------------------|-------------|------------|------------|-------------|--------------|
| <input type="checkbox"/> Diagnostic   | 60 (32.1%)  | 10 (23.8%) | 2 (8.3%)   | 48 (39.7%)  | <b>0.004</b> |
| <input type="checkbox"/> Treatment    | 64 (34.2%)  | 9 (21.4%)  | 4 (16.7%)  | 51 (42.1%)  | <b>0.008</b> |
| <input type="checkbox"/> Surveillance | 173 (92.5%) | 38 (90.5%) | 18 (75.0%) | 117 (96.7%) | <b>0.002</b> |
| Chronic renal failure                 | 107 (57.2%) | 25 (59.5%) | 19 (79.2%) | 63 (52.1%)  | 0.050        |
| <input type="checkbox"/> screening    |             |            |            |             |              |
| <input type="checkbox"/> Diagnostic   | 91 (48.7%)  | 23 (54.8%) | 6 (25.0%)  | 62 (51.2%)  | <b>0.042</b> |
| <input type="checkbox"/> Treatment    | 66 (35.3%)  | 11 (26.2%) | 2 (8.3%)   | 53 (48.8%)  | <b>0.001</b> |
| <input type="checkbox"/> Surveillance | 175 (93.6%) | 39 (92.9%) | 20 (83.3%) | 116 (95.9%) | 0.065        |
| Dementia:                             |             |            |            |             |              |
| - Prevention                          | 104 (55.6%) | 25 (59.5%) | 18 (75.0%) | 61 (50.4%)  | 0.077        |
| <input type="checkbox"/> Screening    | 82 (43.9%)  | 22 (52.4%) | 15 (62.5%) | 45 (37.2%)  | <b>0.032</b> |
| <input type="checkbox"/> Diagnostic   | 68 (36.4%)  | 18 (42.9%) | 4 (16.7%)  | 46 (38.0%)  | 0.089        |
| <input type="checkbox"/> Treatment    | 63 (33.7%)  | 13 (31.0%) | 4 (16.7%)  | 46 (38.0%)  | 0.121        |
| <input type="checkbox"/> Surveillance | 163 (87.2%) | 36 (85.7%) | 18 (75.0%) | 109 (90.1%) | 0.125        |
| Alzheimer:                            |             |            |            |             |              |
| - Prevention                          | 96 (51.3%)  | 19 (45.2%) | 18 (75.0%) | 59 (48.8%)  | <b>0.042</b> |
| <input type="checkbox"/> Screening    | 99 (52.9%)  | 24 (57.1%) | 17 (70.8%) | 58 (47.9%)  | 0.101        |
| <input type="checkbox"/> Diagnostic   | 81 (43.3%)  | 18 (42.9%) | 4 (16.7%)  | 59 (48.8%)  | <b>0.016</b> |
| <input type="checkbox"/> Treatment    | 69 (36.9%)  | 13 (31.0%) | 2 (8.3%)   | 54 (44.6%)  | <b>0.002</b> |
| <input type="checkbox"/> Surveillance | 173 (92.5%) | 39 (92.9%) | 21 (87.5%) | 113 (93.4%) | 0.584        |
| Sickle cell:                          |             |            |            |             |              |
| - Prevention                          | 150 (80.2%) | 37 (88.1%) | 21 (87.5%) | 92 (76.0%)  | 0.017        |
| <input type="checkbox"/> Screening    | 109 (58.3%) | 28 (66.7%) | 19 (79.2%) | 62 (51.2%)  | <b>0.017</b> |
| <input type="checkbox"/> Diagnostic   | 92 (49.2%)  | 23 (54.8%) | 10 (41.7%) | 59 (48.8%)  | 0.597        |
| <input type="checkbox"/> Treatment    | 92 (49.2%)  | 24 (57.1%) | 7 (29.2%)  | 61 (50.4%)  | 0.088        |
| <input type="checkbox"/> Surveillance | 177 (94.7%) | 41 (97.6%) | 22 (91.7%) | 114 (94.2%) | 0.560        |

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Number (percentage)

## Gabonese advanced practice nursing implementation

Appendix 4: Associated factors with advanced practice nurses' implementation's acceptability

|                                    | Univariate model (n=187) |         | Full multivariate model (n=187) |         | Final multivariate model (n=187) |         |
|------------------------------------|--------------------------|---------|---------------------------------|---------|----------------------------------|---------|
|                                    | OR (95% CI)              | p-value | OR (95% CI)                     | p-value | OR (95% CI)                      | p-value |
| Sex (female)                       | 2.01 (0.99 - 4.10)       | 0.052   | 2.38 (1.09 - 5.18)              | 0.029   | 2.44 (1.12 - 5.29)               | 0.024   |
| Age                                | 1.00 (0.97 - 1.04)       | 0.942   |                                 |         |                                  |         |
| Profession :                       |                          |         |                                 |         |                                  |         |
| -medical doctor                    | 0.91 (0.39 - 2.16)       | 0.834   |                                 |         |                                  |         |
| -nurse                             | 1.05 (0.53 - 2.11)       | 0.883   |                                 |         |                                  |         |
| -nursing student                   | 0.99 (0.54 - 1.82)       | 0.986   |                                 |         |                                  |         |
| Professional work place :          |                          |         |                                 |         |                                  |         |
| -Hospital                          | 3.95 (0.40 - 38.69)      | 0.238   | 1.61 (0.06 - 45.86)             | 0.782   |                                  |         |
| -Town                              | 0.30 (0.06 - 1.58)       | 0.156   | 0.34 (0.02 - 4.77)              | 0.421   |                                  |         |
| Experience                         | 0.99 (0.95 - 1.04)       | 0.771   |                                 |         |                                  |         |
| APN could diagnose chronic disease | 0.38 (0.18 - 0.83)       | 0.015   | 0.32 (0.14 - 0.75)              | 0.008   | 0.32 (0.14 - 0.74)               | 0.008   |
| Planned exercise location:         |                          |         |                                 |         |                                  |         |
| -Hospital                          | 1.46 (0.64 - 3.30)       | 0.367   |                                 |         |                                  |         |
| -Town                              | 0.66 (0.37 - 1.18)       | 0.160   | 0.77 (0.41 - 1.44)              | 0.418   |                                  |         |
| -Rural                             | 0.73 (0.33 - 1.59)       | 0.428   |                                 |         |                                  |         |
| Awareness of APN existence         | 0.42 (0.23 - 0.79)       | 0.007   | 0.40 (0.20 - 0.79)              | 0.009   | 0.41 (0.21 - 0.79)               | 0.007   |
| Cleavage risks                     | 0.73 (0.41 - 1.34)       | 0.315   |                                 |         |                                  |         |
| Under-recognition of APN risks     | 0.93 (0.47 - 1.85)       | 0.869   |                                 |         |                                  |         |

APN: advanced practice nurses; CI: confidence interval; OR: odds ratio