



INSTITUTO
UNIVERSITÁRIO
DE LISBOA

Towards Improved Staffing Policies and Practices in Medical Institutions: The Case of SZ Maternity and Child Healthcare Hospital

WEI Ning

Doctor of Management

Supervisor:
PhD Nelson Ramalho, Associate Professor,
ISCTE University Institute of Lisbon

January, 2023



BUSINESS
SCHOOL

Marketing, Operations and General Management Department

Towards Improved Staffing Policies and Practices in Medical Institutions: The Case of
SZ Maternity and Child Healthcare Hospital

WEI Ning

Doctor of Management

Supervisor:
PhD Nelson Ramalho, Associate Professor,
ISCTE University Institute of Lisbon

January, 2023



BUSINESS
SCHOOL

Marketing, Operations and General Management Department

Towards Improved Staffing Policies and Practices in Medical Institutions: The Case of SZ Maternity and Child Healthcare Hospital

WEI Ning

Doctor of Management

Jury:

PhD João Carlos Rosmaninho de Menezes, Associate Professor with Habilitation,
ISCTE University Institute of Lisbon

PhD Maria del Pilar Mosquera Fernandez Conde, Assistant Professor,
ISEG – Universidade de Lisboa

PhD Wang Dong, Full Professor,
Southern Medical University

PhD Ana Patrícia Pereira Duarte Baltasar, Integrated Researcher,
ISCTE University Institute of Lisbon

PhD Nelson Jorge Campos Ramalho, Associate Professor,
ISCTE University Institute of Lisbon

January, 2023

[This page is deliberately left blank.]

Abstract

Staffing policies are important in any organization but in healthcare they are more critical. Problems from a mismatch between staff numbers requirements and offer are well documented in literature, especially the shortage of workforce in hospitals. Qualitative mismatch, i.e. the lack of suitable staff skills, are seldom integrated in these models. This research tests the joint effects of quantitative and qualitative staff mismatch in a healthcare organization in SZ so to understand how staffing management policies condition staffing adequacy, and how staffing adequacy leads to important HR outcomes.

A first qualitative study identified five dimensions of staffing management policies, namely decision making, data management, sourcing, productivity optimization, and title vs. competency. Based on this categorization, a 13-item scale was produced and its psychometric quality ascertained. A quantitative study was conducted with 1323 healthcare professionals working in the hospital, matched by dyads and teams. A conceptual model with work engagement as a mediator between quantitative staffing adequacy interaction with qualitative staffing adequacy in explaining team performance was tested with Structural Equations. Findings show staffing policies do exert effects on staffing adequacy. Findings also show quantitative and qualitative staffing adequacy interact in explaining work engagement and team performance and that the moderated mediation occurs as hypothesized.

So, findings suggest both types of staffing adequacies matter to promote higher team performance via a heightened sense of work engagement from healthcare professionals. The supported model is helpful to better design staffing management policies and increase the staffing fit so to improve hospital performance.

Keywords: Staffing management; personnel shortage; skills mismatch; hospital

JEL: M12 Personnel Management; I18 Health - Government Policy, Regulation

[This page is deliberately left blank.]

Resumo

As políticas de staffing são importantes nas organizações, mas nos cuidados de saúde são mais críticas. Os problemas decorrentes de um desajuste entre os requisitos e a oferta de mão-de-obra estão bem documentados na literatura, especialmente a escassez de profissionais nos hospitais. Porém, o desajuste qualitativo, ou seja, a falta de competências adequadas, raramente é considerada. Esta investigação testa os efeitos conjuntos do desajuste quantitativo e qualitativo dos profissionais numa organização de saúde em SZ, para compreender como as políticas de staffing condicionam a adequação da mão-de-obra, e como esta explica resultados importantes de GRH.

Um primeiro estudo qualitativo identificou cinco dimensões de políticas de staffing nomeadamente a tomada de decisão, gestão de dados, sourcing, optimização da produtividade, e título vs. competência. Com base nesta categorização, foi produzida uma escala de 13 itens e a sua qualidade psicométrica verificada. Um segundo estudo, quantitativo, com 1323 profissionais de saúde que trabalhavam no hospital, combinado por díades e equipas testou com equações estruturais um modelo conceptual com o envolvimento no trabalho como mediador entre a interacção quantitativa da adequação do pessoal com a adequação qualitativa do pessoal na explicação do desempenho da equipa. Os resultados mostram que as políticas de staffing exercem efeitos sobre a adequação do pessoal, que a adequação quantitativa e qualitativa do pessoal interage na explicação do compromisso de trabalho e do desempenho da equipa e que a mediação moderada ocorre.

Os resultados sugerem que ambos os tipos de adequação do pessoal são importantes para promover um maior desempenho da equipa através do sentido de envolvimento no trabalho por parte dos profissionais de saúde. O modelo apoiado é útil para melhor conceber políticas de staffing e aumentar a adequação dos profissionais de modo a melhorar o desempenho hospitalar.

Palavras-chave: Gestão de pessoas; falta de pessoal; desadequação de competências; hospital

JEL: M12 Gestão de pessoas; I18 Saúde - Política Governamental, Regulamentação

[This page is deliberately left blank.]

摘要

人员配置政策在任何组织中都是重要的，但在医疗卫生领域则更为关键。文献中很好地记录了工作人员数量需求和提供之间不匹配的问题，特别是医院劳动力的短缺。质量上的不匹配，即缺乏合适的员工技能，很少被纳入这些模型中。本研究测试了深圳一家医疗机构中员工数量和质量不匹配的共同影响，以了解人员管理政策如何制约人员的充足性，以及人员的充足性如何导致重要的人力资源结果。

第一个定性研究确定了人员配置管理政策的五个维度，即决策、数据管理、采购、生产力优化和职称与能力。在这个分类的基础上，制作了一个 13 个项目的量表，并确定了其心理测量质量。我们对在医院工作的 1323 名医护人员进行了定量研究，并按双人和团队进行匹配。用结构方程检验了一个概念模型，该模型将工作参与作为定量人员配置充分性与定性人员配置充分性之间的中介来解释团队绩效。研究结果显示，人员配置政策确实对人员配置的充分性产生了影响。研究结果还显示，定量和定性的人员配置充分性在解释工作参与和团队绩效方面相互作用，并且发生了假设的调节作用。

因此，研究结果表明，两种类型的人员配置的充分性都是通过提高医护人员的工作参与感来促进更高的团队绩效。所支持的模型有助于更好地设计人员配置管理政策，提高人员配置的适应性，从而提高医院绩效。

关键词：人员管理；人员短缺；技能不匹配；医院

JEL: M12 人事管理；I18 卫生-政府政策、法规

[This page is deliberately left blank.]

Acknowledgments

A doctoral dissertation is not the effort of one person. During this period, too many people have given me too much help, and there are too many people to thank.

First of all, I would like to sincerely thank my Portuguese mentor Professor Nelson Ramalho for his careful teaching and guidance over the past three years.

From Professor Nelson Ramalho, I have seen the real scholar's style and let me appreciate the academic charm. At the first meeting, I learned my thoughts and ideas about the paper with great patience. Although in recent three years, we couldn't go to the school in person to get face-to-face guidance from teachers due to the epidemic, we could only communicate regularly through online video conferences. The teacher's guidance to me is specific and rigorous, guiding me how to carry out literature review and establish models; It also taught me how to do interviews, how to design questionnaires, and how to write; I was required to strictly follow the academic norms at every step of my research, and the more critical the step, the more stringent the requirements will be. But from the data analysis and the results of the paper, it is worth sticking to the original.

Thank Nelson Ramalho for his trust and guidance. In terms of topic selection, research ideas and research methods, it gives me sufficient space and helps me a lot. At each critical stage of the progress of the paper, he would use his rich academic experience to guide me and put forward very practical and effective suggestions. His embellishment of the paper made me feel even more inspired.

Thank the doctoral program of the School of Health Management of Southern Medical University, and thank Wang Dong, the dean of the doctoral program of the School of Health Management of Southern Medical University, and Ou Weiyan, the director of the program, for helping me with my studies.

I would like to thank my colleagues Wang Zhongwei, Li Xiyuan and Zhang Yibing for their work in the distribution and recovery of the questionnaire.

My heartfelt thanks to my husband, daughter and son for their firm support and constant encouragement, which enabled me to successfully complete my studies.

[This page is deliberately left blank.]

致谢

一篇博士论文不是一个人的努力，在这期间太多人给了我太多的帮助，要感谢的人也太多太多。

首先要衷心感谢我的葡方导师 Nelson Ramalho 教授在 3 年来对我的悉心教诲和指导。

从 Nelson Ramalho 教授身上，我见识到了真正的学者风采、让我领略到学术的魅力。初次见面，就非常有耐心地了解我对论文的思路 and 想法，虽然近三年因为疫情不能亲临学校得到老师面对面的指导，我们只能通过线上视频会议进行定期沟通。老师对我的指导是具体的、严谨的，指导我如何开展文献综述、建立模型；也教会我如何做访谈，如何设计问卷，如何写作；要求我在研究的每一步都严格遵照学术规范，越是关键步骤就越是要严格要求，但从数据分析和论文结果看，当初的咬牙坚持是值得的。

感谢 Nelson Ramalho 老师的信任和指导。在论文的选题、研究思路和研究方法上，给予了我充分的空间，也对我帮助良多。在论文进展的每个关键阶段，都会用他丰富的学术经验去指导我，提出非常实用和有效的建议，他对论文的润色更是让我感慨堪比神来之笔。

感谢南方医科大学卫生管理学院博士项目，感谢南方医科大学卫生管理学院博士项目的王冬院长、项目主任欧玮艳对我学业的帮助。

感谢我的同事王忠伟、李希圆、张译冰在问卷发放、回收方面做的工作。

衷心感谢我的丈夫、女儿和儿子，是他们的坚定支持和不断的鼓励才得以让我顺利完成学业。

[This page is deliberately left blank.]

Contents

Chapter 1: Introduction	1
1.1 Research background	1
1.1.1 Practical background	1
1.1.2 Theoretical background	3
1.2 Research purpose and content	4
1.2.1 Research purpose	4
1.2.2 Research content	4
1.3 Research significance	5
1.3.1 Theoretical significance	6
1.3.2 Practical significance	6
1.4 Research methods and technical route	7
1.4.1 Research method	7
1.4.2 Technical route	8
1.5 Research innovations	11
Chapter 2: Literature Review	13
2.1 Healthcare in China	14
2.2 Healthcare HRM challenges in China	20
2.2.1 Attracting and recruiting the right number and professional skills profile	20
2.2.2 Retaining the right employees	22
2.2.3 Evaluating performance	24
2.2.4 Aligning staffing needs with staffing practices	26
2.3 Staffing management	28
2.4 Towards a staffing management process model	30
2.4.1 Staffing management policies	31
2.4.2 Consequences of quantitative staff inadequacy: team performance	35
2.4.3 Consequences of quantitative staff inadequacy: work engagement	40
2.4.4 The qualitative side of staff inadequacy	43
2.4.5 Conceptual model	45
Chapter 3: Study 1 Qualitative Study	49
3.1 The organization: SZ Maternity and Child Healthcare Hospital	49

3.1.1 Organizational overview	49
3.1.2 Human resource overview	52
3.1.3 Department setup and organizational structure	53
3.2 Method	66
3.2.1 Developing the interview script	66
3.2.2 Eligibility criteria	68
3.2.3 Procedure.....	71
3.2.4 Data collection and analysis	71
3.3 Results	79
3.4 Discussion and conclusion of study 1	83
Chapter 4: Study 2 Quantitative Model Test	87
4.1 Introduction	87
4.2 Method	88
4.3 Results	100
4.3.1 Descriptive and bivariate analysis.....	100
4.3.2 Hypotheses testing.....	103
4.4 Discussion and conclusion	109
Chapter 5: General Discussion and Conclusion	115
5.1 Theoretical contributions.....	118
5.2 Managerial implications	119
5.3 Research limitations and prospects	121
5.3.1 Research limitations	121
5.3.2 Research prospects	122
Bibliography.....	123
Webliography	135
Annex A: The Interview Scripts.....	137
Annex B: Study 2 Outputs	139
Annex C: Departmental Levels	143

List of Tables

Table 3.1 Description interviewed experts.....	68
Table 3.2 Coding categories and contents.....	74
Table 3.3 Table of categories and frequencies	80
Table 3.4 Table of categories and frequencies	80
Table 3.5 Table of categories and frequencies	81
Table 3.6 Table of categories and frequencies	82
Table 4.1 Sample description	92
Table 4.2 Rotated matrix for EFA staff adequacy	93
Table 4.3 Rotated factor solution for staffing management policies	95
Table 4.4 Descriptive and bivariate statistics	102
Table 4.5 Estimates for SMP-staffing adequacy model	104
Table 4.6 Direct, indirect and interaction effects	106

[This page is deliberately left blank.]

List of Figures

Figure 1.1 Technical route for the research.....	10
Figure 2.1 Conceptual model	47
Figure 3.1 SZ Maternity and Child Healthcare Hospital Organizational Chart.....	65
Figure 4.1 CFA for staffing management policies	96
Figure 4.2 CFA for team performance as stated by team leaders	97
Figure 4.3 CFA for team performance as stated by team members	98
Figure 4.4 CFA for work engagement	99
Figure 4.5 Moderating effect diagram QuanS*QualS->TeamPerformance.....	108
Figure 4.6 Moderating effect diagram QuanS*QualS->WorkEngagement	109

[This page is deliberately left blank.]

Chapter 1: Introduction

1.1 Research background

Research background comprises both the practical background, intended to explain the context both at societal and organizational levels, which mainly focus on the development of China's health care industry and the current situation of human resource management in health care, as well as the theoretical background, intended to explain the theories that can help understand the phenomenon under study as well as the relations entailed in the conceptual model.

1.1.1 Practical background

Since the founding of New China, especially after the implementation of the “Reform and Opening” policy, China's healthcare has made world-renowned achievements, with a significant increase in the average life expectancy of people, a significant decrease in neonatal mortality, and a gradual improvement in various health indicators.

Despite these internationally recognized achievements, China's healthcare system, like any other, is subjected to dynamics that are intrinsically linked to population changes (e.g. aging, birthrate) and pose new challenges and issues that have been progressively tackled with the deepening of the reform of the medical and health system. Currently, these challenges have been surfacing in the area of healthcare human resource management which gained central importance since 2009 when they were formally targeted as a priority in policy making. One of the challenges in this domain pertains to the practices concerning how to achieve alignment between staffing needs and staffing practice in healthcare organizations.

Staffing is always a complex issue in management because it relates to a dynamic reality that is not always within the predictive ability of decision makers. These dynamics express changes in the staff that make e.g., employee turnover a guaranteed phenomenon for many reasons such as retirement, voluntary quitting, transfer, sickness leave or any other motive that may escape the control of managers. As the content of job becomes more complex, more staff will be needed and the staff needs to have a greater range of competencies, staffing decisions also become more complex and difficult, which shows an urgent need to do a research in staffing management field.

There are two aspects of staffing that decision makers need to attend to: quantity and quality. In terms of quantity of staffing both too much and not enough staffing are undesirable situations. Only an optimum will lead to improving productivity.

When the number of staffing exceeds the demand, the layman interpretation would foster the erroneous idea that by having too many available professionals, services run better (because they never lack healthcare workforce) but a deeper analysis and understanding of findings in research indicates that this overstaffing situation leads to low motivation of clinical staff due to the insufficient challenge in work rhythm. It is also obvious that such situation is not desirable from the viewpoint of resource management because it is intrinsically a waste of clinical resources. Conversely, when the number of staff falls short from meeting the demand, clinical staff will take on too much workload, thus creating fatigue and stress affecting performance output.

This commonly reported situation in many countries has gained the status of a worldwide challenge as evidenced by the World Health Organization issue of the Global Strategy on Human Resources for Health: Workforce 2030. This global policy is intended to counter the estimated shortage of 10 million health workers by 2030. Unsurprisingly, this has been stated as the biggest threat to global health because understaffing has been found to lead to critical outcomes related to patient risk, treatment effectiveness and preventable death. Moreover, the lack of qualified medical staff is a relatively common phenomenon worldwide. For example, approximately 6% to 12% of physicians in the United States do not meet the requirements of their job. Data from Ontario show that about 15% of family physicians and 3% of specialty physicians are not qualified for their jobs (Grace et al., 2014) and in Netherlands the estimated prevalence is 5% (Van der Heijden et al., 2019).

This certainly proves that there is room for improvement in training but also that recruitment effectiveness (in filtering out unsuitable cases) is failing and hospitals need to bear the cost of re-recruitment. It is worth noting that staff quality mismatch is also heavily detrimental to healthcare as it exerts a negative impact on the hospital, ineligible medical staff will not only reduce performance but also affect patient satisfaction and also patient safety. Therefore, good staff management policies are critical in promoting the achievement of organizational goals, providing the necessary healthcare services to people and also improving health professional work quality thus increasing employee satisfaction, retention and work engagement.

However, because the topic of staffing management policies is not entirely explored and the construct has a blurred composition about what sort of dimensions staffing management

policies entail, it is fundamental to better explore and understand this construct and what practices may be deployed based on its nature.

1.1.2 Theoretical background

There is no specific theory for staffing management. However, scholars have adopted theories depending on the specific focus of their research entailing staffing management consequences. The overarching theoretical framework concerns the idea that staffing management has both a quantitative (the right number) and qualitative (the right profile) dimension. To understand how these dimensions affect HRM and organizational outcomes, researchers have e.g., used motivational theories (Prosocial motivation) (Grant, 2007).

Akin to this practice, and considering our conceptual model, the following theories have been adopted:

AMO (Ability-Motivation-Opportunity) theory by Jiang et al. (2013). This theory, set forth in HRM, gained wide acceptance as it integrates HR practices within the larger scope of their intention. E.g., training and development are obviously intended to enhance “ability”, while compensation and rewards or job design are intended to enhance “motivation”. The concurrence of the three dimensions is required for high performance (Armstrong, 2006).

SET (social exchange) theory by Homans (1958) and Blau (1964) has also become very popular and widely used to understand organization HR phenomena (Cropanzano et al., 2017). This theory departs from a premise that human interaction is fundamentally a transactional event where individuals exchange tangible and intangible resources. This idea has been used to explain job performance or team performance as a reciprocation to how organizations treat HR. Understaffing, overstaffing and mistakes in matching profiles with needs all can be taken as failures in providing the right resources, to which individuals and team react by returning lower performance. This theory has also been used to explain intermediate psychological states that have been found to be critical for performance, namely work engagement.

P-J fit (Person-job fit) theory has also been used to focus on the importance of fit between those hired (or allocated internally) and the requirements of the job. This fit entails both the quantitative dimension (work hours, number of staff) as well as the qualitative dimension (technical knowledge, work related skills, attitudes).

Complementing these theories, the JD-R (Job demands resources) is relevant because it helps explaining why individuals detach psychologically from the job or organization (lower vigor, lower dedication, lower absorption) and why their performance is suboptimal (Bakker & Demerouti, 2017).

1.2 Research purpose and content

1.2.1 Research purpose

Because staffing management policies remain a blurred construct as regards the dimensions it entails, it is necessary to understand what dimensions are needed for a complete and practical staffing management policy without which we cannot clearly understand in a systematic way its nature and suitably design such policies, this thesis is developed to offer such clarity, or at the minimum, uncover the dimensions of staffing management policies for the general healthcare field.

1.2.2 Research content

This thesis consists of five chapters.

The first chapter is introduction. It starts by presenting the practice background that is the framing its relevance and utility for organizational management to then introduce the research background, research purpose and significance for extant knowledge. Then it shows a preview of the thesis structure, methods adopted and the technical route that was designed to develop the research.

The second chapter is intended to do a review of literature that starts by explaining healthcare system in China, how it has evolved and how it is currently, so to offer a comprehensive understanding of the research context. It then moves into the challenges that healthcare system currently faces, among which the focus of this thesis (staffing management). With a view on the challenges (a. attracting and recruiting the right number and right profile of healthcare workers, b. retaining the right employees, c. evaluating performance, d. aligning staffing needs with staffing practices), the chapter explores staffing management as a practice, as well as a process (from the policy making level to the behavioral consequences and organizational outcomes). In this chapter, as the literature review progresses, hypotheses are derived and at the end, for clarity's sake, the conceptual model is presented graphically with the list of all the hypotheses it entails.

The third chapter presents the first study, of a qualitative nature. Because the relevant literature has already been reviewed, to avoid redundancy, the chapter starts by introducing the empirical context (i.e. the organization targeted for the study: SZ Maternity and Child Healthcare Hospital) providing an overview of the organization (i.e. its history background,

macro level and departmental structure, outcomes, clinical focus and services provided, and the HR structure); the research method (namely the interview scripts, the criteria to define interviewees, the exact profile of interviewees, the procedure – data collection and data analysis, its respective coding and categories), results from content analysis (guided by research questions and showing tables of categories and frequencies, as well as some illustrative excerpts from the interviews). It ends with the discussion of findings and conclusions from this first study, intending to conclude the exact dimensions that could be used to explain the staffing management policies in the sample hospital and to draft the questionnaire that could be used in the next study.

The fourth chapter presents the second study, of a quantitative nature. Because it also is based on the literature reviewed, to avoid unnecessary redundancies, we started by focusing on the methodological approach, and respective methods (procedure for the survey by questionnaire deployment, data processing and data analysis, sample, measures used in the questionnaire (the variables that are depicted in the conceptual model) with a focus on its validity and reliability (showing all the construct validity, convergent and divergent validity tests as well as reliability indicators, e.g. Cronbach alpha). The chapter shows the results starting with the descriptive and bivariate statistics, and moving into the hypotheses testing from structural equations modelling (SEM) and path analysis with PROCESS. The chapter ends with the discussion of findings and the conclusion from the study, giving explanations and results to the hypothesizes that are proposed.

The fifth chapter comprehends the general discussion of findings and the main conclusions from the thesis highlighting its theoretical contributions, managerial implications and acknowledging the research limitations and avenues for future research.

There is the conventional last chapter (which is not considered formally so) which list of the references used to do the literature review and support the conceptual model, methods and techniques as well as the discussion of findings.

1.3 Research significance

Staffing management is a recurrent topic in HRM and in healthcare management it has become more central due to a) the lack of professionals as compared to the growing population need, b) the personnel turnover which makes this a critical challenge in daily operations, and c) the fact that as a professional organization, an hospital tends to have managers than came from the clinical ranks (which have been professionally credited for their clinical expertise and for whom

management was not the main professional driver, but just a consequence of taking up more responsibilities). This study focuses on the construction and improvement of a staffing management policy framework in healthcare, and the study was conducted in a well-known 3A case hospital, making the findings of the study of practical reference value.

This topic, albeit amply researched within HRM field, has not been strongly systematized as regards staffing management policies especially within the scope of healthcare industry. Thus, there is not only a practical significance as a potential contribute for theory building.

1.3.1 Theoretical significance

As stated, there is no single theory that has been specifically developed to tackle staffing management policies and practices. However, theories used within this context have been targeting specific relations between staffing and individual subjective experiences and work outcomes.

Our conceptual model integrates some of these theories (already mentioned above), which is not so commonly observed and can be helpful in future theoretical developments within this field.

What might be taken as a more central theoretical contribution of this study is the moderation effect because it highlights the importance of attending not only to quantitative staffing adequacy (as most of the HR literature does) but also to the qualitative staffing adequacy. Both could have been used as parallel predictors of work outcomes (work engagement and team performance) but we think that option would be theoretically poor as it disconnects both (as if they do not interact at all). We reason, the moderation is a better approach to understand their joint effects. This is especially relevant in highly qualified professional services such as healthcare where the quality of service is directly dependent on HR having the right set of knowledge, skills and attitudes but also on having enough (and not too many) workforce to comply with demand without exerting deleterious effects in individuals. We think AMO (Jiang et al., 2013) has a direct application here and can further integrate both the quantitative and qualitative dimensions in staffing management research by incorporating similar interaction effects.

1.3.2 Practical significance

Hospital staff management policies are important for talent attraction, recruitment and retention. A good staff management policy can achieve a win-win situation for both individuals and the

organization. Conversely, an inefficient staff management policy can easily lead to staff dissatisfaction (Judge et al., 2020), burnout and grievances (Gutsan et al., 2018), resulting in staff turnover and production staff shortage (Scanlan & Still, 2019). Based on this, this thesis is designed to offer an analysis of the impact of staff management policies on qualitative and quantitative understaffing. Both dimensions are important but seldom related in the same empirical study.

Quantitative understaffing is an important issue in human resource management in the healthcare field, and this issue leads to burnout, high employee workload, fatigue, depression, negativity, and increased work errors (Adapa et al., 2022), which adversely affects healthcare services quality (Härkänen et al., 2019), based on which we hypothesize a negative relationship between understaffing and team performance. When quantitatively understaffed, employees take on more workload and demand more work hours, which may not match their own characteristics or willingness, which in turn leads to low work engagement (Cai et al., 2021), based on this, this thesis proposes a negative relationship between quantitative understaffing and work engagement. There are many mediating factors that lead to a decrease in quality of care due to understaffing, and work engagement was selected to play this role linking quantitative understaffing to team performance. To achieve alignment between staffing needs and practice, the right number of employees and employees with the right skills are equally important, and to further integrate literature and knowledge this thesis explores the interaction qualitative understaffing can have upon the mediated model.

1.4 Research methods and technical route

1.4.1 Research method

This research is designed based on a mix-methods approach conducted withing the context of a single organization, thus being a case study. We opted to choose a single organization (SZ Maternity and Child Healthcare Hospital) because it allows a better control of extraneous variables that may be alternative explanations for the variables within the conceptual model.

We reason that a better understanding of staffing management policies within the context of China starts with an inductive study. The inductive study departs from experts' perceptions about staffing management in the case hospital, to extract the dimensions and indicators suitable for describing hospital staffing policies. This is expected to lay the foundation for a comprehensive and systematic understanding of the current hospital human resource allocation

and management. This qualitative study informs a second study, of a hypothetic-deductive nature that allows to test the underlying propositions of the thesis.

Therefore, this research has two objectives that are matched by the same number of empirical studies. Firstly, we start by uncovering the dimensions of staff management policies, analyzing the observed variables applicable to describe hospital staff management policies through the method of expert interviews. These interviews were conducted with a large number of decision makers from all ranks in the organization so to gain a comprehensive understanding of the staffing management situation and opinions on its betterment. It was especially important to uncover the dimensions underlying thinking about staffing management policies. This knowledge enables to develop a questionnaire that can be used to investigate hospital human resource management policies. Based on this instrument and backed by theory and extant literature, a second study raises hypotheses on the impact of staff management policies and quantitative and qualitative staffing (in)adequacy on team performance.

In detail, 83 interviews were conducted with decision makers from the Leader board level, 1st level directors, and team leaders (clinical and administrative) to depict the current situation and challenges as regards staffing management experienced in SZ Maternity and Child Healthcare Hospital, which allowed the identification of five key-dimensions to systematize staffing management policies. The quantitative study is based on 1323 valid questionnaires from 1600 distributed, comprehending all ranks and departments in the hospital. The questionnaire included a novel scale derived from the first qualitative study as well as existing scales for the variables in the conceptual model, that have already been used and published in peer reviewed outlets. Data was analyzed to gauge the psychometric quality of measures (validity and reliability) as well as for testing their specific associations with structural equations modelling and path analysis, according to the hypotheses.

1.4.2 Technical route

Departing from a real-world problem that has not yet a clear theoretical framework or model to manage it (staffing management inadequacies). We defined a research question focused on staffing management policies.

To fully understand the topic and what it entails, we conducted a literature review by observing steps (Jesson et al., 2011). Firstly, understand what we know and what is yet to be explored as regards staffing management policies. Secondly, do a comprehensive search of literature that contains relevant keywords in title, abstract and text and take notes of the

references of each article and book found. Also take notes on the main ideas, and research methods. Thirdly, to select the most relevant papers based on the abstract, the whole paper and quality of the source (e.g. if the article is indexed and what rank it has). Fourth, to record the reference fields (title, author, journal, volume, pages) and main findings. Fifth, to synthesize the main ideas of each paper, and finally to write those in a systematic fashion as a literature review.

With the first large set of papers processed and written down, we have checked whether our initial research idea matches a true research gap in literature, that is, the framework of the staffing management policy and the dimensions that can be used to explain the concept. and exploring a conceptual model that is helpful to fill in that gap.

Because the research gap found is wider than initially expected as regards staffing management policies, we devised an inductive study to uncover the staffing management dimensions. We were hopeful that such dimensions could be extracted from content analysis with a large sample of interviewees and that it could be transformed into a scale for measurement purposes. With this achieved, the conceptual model was confirmed and the hypotheses put forward together with the research methods to be deployed. The next step was to guarantee suitable data collection with the survey by questionnaire, which was achieved at a large scale. Lastly, data analysis was deployed to test for validity and reliability issues in measures, both with confirmatory factor analysis and exploratory principal components analysis, descriptive and bivariate statistics and path analysis. Lastly, we showed the findings from empirical results (we had already in the first study but then do it again in the second study) and discuss them at the light of the theory acknowledging both limitations and prospects for research.

The technical route framework for the thesis is depicted in Figure 1.1.

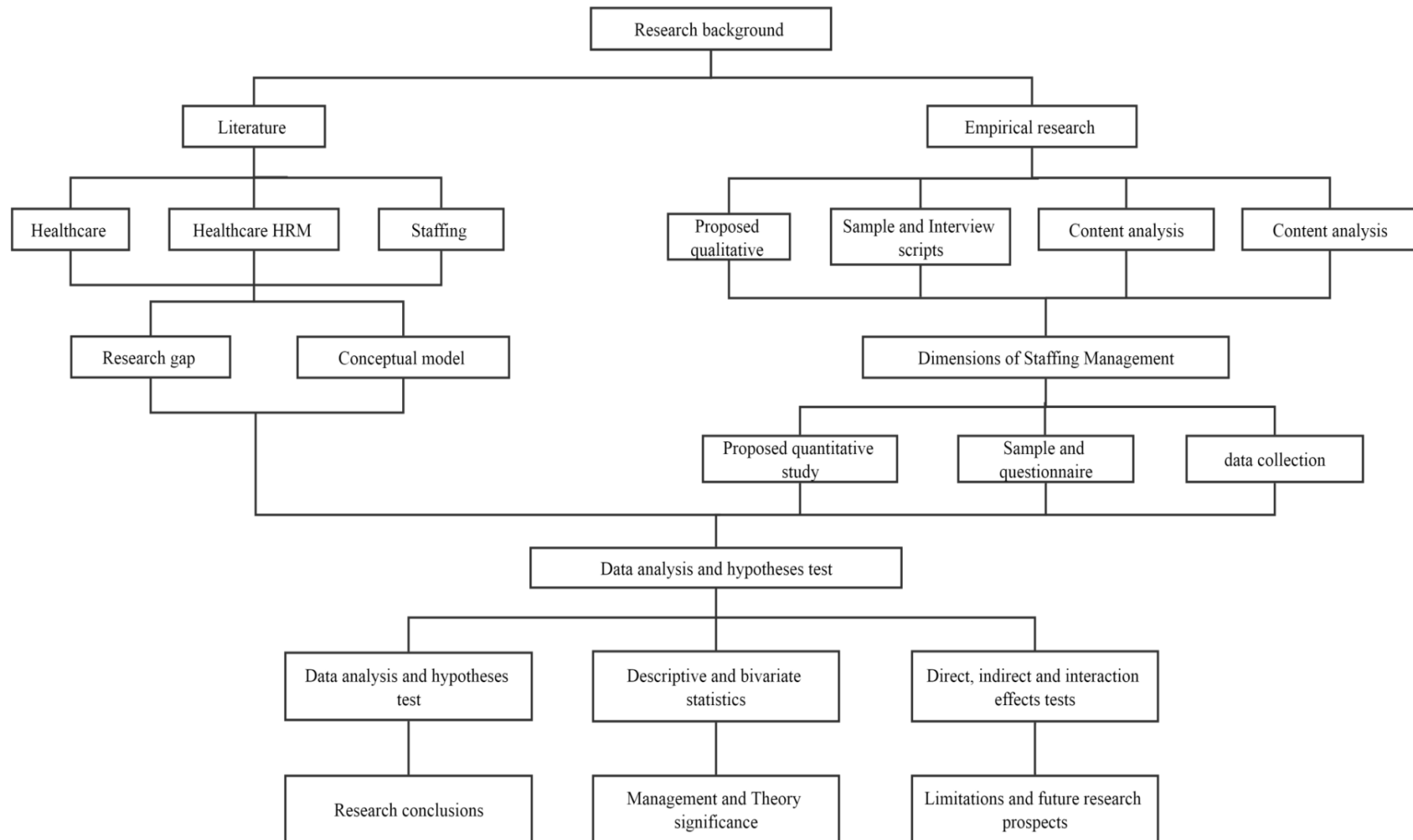


Figure 1.1 Technical route for the research

1.5 Research innovations

We trust the thesis may offer the following innovations.

The staff number and adequacy of staffing were described by summarizing the opinions of the interviewed experts to explore the observed variables that can describe the staffing management policies. This is innovative because most of the current research on hospital human resources has focused on the current status and criteria of human resource allocation, while the study of hospital human resource management policies has not been in-depth enough and the dimensions describing hospital human resource management policies are not yet clear.

Alongside with this innovation, the production of a novel measure for Staffing Management Policies (which is psychometrically sound) is innovative.

To our knowledge, the specific interaction effects between quantitative and qualitative staff adequacies is also novel in the sense that it brings to the quantitative studies the idea that both are necessary (as in a configuration) to maximize their benefits.

Proposing a mediation effect of work engagement between an HR practice and performance is definitely now new, but to propose it linked directly with staffing management adequacy is, in our view, novel while offering a strong point for scholars and managers to make an empirical argument in favor of the importance of staffing management policies and practices.

Additionally, by testing the psychometric quality of some measures, this study offers more assurance about its use in Chinese healthcare context. We realize the sample is restricted to a single hospital but it is reasonable to assume its dynamics (as regards staffing management difficulties) will not differ much from same-level specialized central hospitals in urban context.

[This page is deliberately left blank.]

Chapter 2: Literature Review

Healthcare is a critical sector that provides essential services to society. As such, staffing management in healthcare is a crucial aspect that must be given adequate attention. This is because effective staffing management practices have a significant impact on the quality of care provided to patients, staff morale, and overall organizational performance. To better understand staffing management in healthcare, it is essential to focus on several key streams.

The first stream is healthcare in China. China's healthcare system has undergone significant changes over the years, which has resulted in the current situation. Understanding the evolution of the healthcare system in China is critical in identifying the current healthcare HRM challenges and how they can be addressed.

The second stream is healthcare HRM challenges in China. The healthcare sector in China faces several challenges, including a shortage of skilled healthcare workers, poor working conditions, low staff morale, and inadequate funding. These challenges impact the quality of care provided and must be addressed through effective staffing management practices.

The third stream is staffing management. Staffing management in healthcare involves the processes of identifying, attracting, selecting, and retaining qualified staff to provide high-quality care. Effective staffing management practices require a thorough understanding of the skills, knowledge, and attributes required for different positions and the ability to match these requirements with the skills and attributes of potential candidates.

The fourth stream is the staffing management process model. This model aims to structure the staffing management process, starting from policy making to the translation of policies into practices that promote a quantitative and qualitative match between staff and their roles. This, in turn, leads to psychological states that ultimately contribute to job performance and work team performance.

The staffing management process model is made up of several stages. The first stage is job analysis, which involves identifying the skills, knowledge, and attributes required for different positions. The second stage is recruitment, which involves attracting and selecting potential candidates. The third stage is orientation and training, which involves providing new staff with the necessary skills and knowledge to perform their roles effectively. The fourth stage is performance management, which involves monitoring staff performance and providing

feedback to improve performance. The fifth and final stage is career development, which involves providing staff with opportunities for growth and career progression.

In conclusion, effective staffing management practices are critical to the success of healthcare organizations. By understanding the evolution of the healthcare system in China, identifying healthcare HRM challenges, and implementing the staffing management process model, healthcare organizations can attract, select, and retain qualified staff, ultimately leading to improved quality of care and organizational performance.

2.1 Healthcare in China

Increasing health expenditure and changing healthcare needs have led to significant changes in health service provision and operational models worldwide since the early 1980s (Liang & Brown, 2008). In recent years, China's healthcare sector continues to develop at an astonishing rate: spending has grown from US\$357 billion in 2011 to US\$1 trillion in 2020. From pharmaceuticals to medical products to consumer health, China remains among the world's most attractive markets. There are three themes that shape China's healthcare market: the continuation of economic and demographic trends, further healthcare reform, and the policies articulated in the government's 12th five-year plan back in 2010. Some of these forces - such as improvements in infrastructure, the broadening of insurance coverage, and significant support for innovation - have positive implications for multinational companies. Others - for example, pressure on pricing and the rise of local champions - have negative implications. In certain respects (including the bid to reconcile low-cost universal healthcare coverage with rewards for innovation) the forces come into direct opposition. To paraphrase Vice Premier Li Keqiang, reform of the country's health-care system has entered uncharted waters (Le Deu et al., 2012).

Since the founding of the PRC in 1949, China has experienced dramatic changes in its healthcare system. Like many other countries, China's healthcare reform has also undergone a difficult exploratory process. Therefore, it is necessary to briefly review the progress of reform of the healthcare system over the past 70 years. China's healthcare reform has been divided into three stages (Tao et al., 2020): Stage 1: 30 years after the founding of People's Republic of China (1949–1979); Stage 2: 30 years after the 'reform and opening up' policy (1979–2009); Stage 3: the latest round of healthcare reform (2009 to present).

In the stage 1, with a weak foundation, the State developed a centrally planned socialist system, emphasizing public ownership and welfare, mass-based collectivism and egalitarianism. In the health sector, the government managed a centrally directed health delivery

system, and defined four principles to guide health and medical work: (1) serve the workers, peasants and soldiers; (2) put prevention first, in particular through the Patriotic Health Campaigns; (3) integrate traditional Chinese medicine with Western medicine, and (4) combine health work with mass movements. These principles of healthcare delivery reform contributed to the rapid improvement in the health of the population, creating some reform models that were highly valued by the WHO.

In the stage 2, China began its ‘reform and opening-up’ policy, ushering in a socialist market economy that encouraged a free market and focused on economic growth. This led to a fundamental transformation of the Chinese healthcare system and had a profound impact. With privatization and marketization, the changes in the healthcare system included: a shift from public financing to private sources; a reorganization of public hospitals and clinics into commercial enterprises; decentralizing healthcare governance to local governments; and a pricing policy that enabled facilities to gain profits. These changes helped expand healthcare resources and improve medical technology and equipment, but also posed many problems, resulting in a series of adverse effects, such as increased disparities between rural and urban residents, a decline in public health, rising healthcare costs and sharp decreases in insurance coverage.

In the stage 3, with the policy goals of achieving a ‘harmonious society’ as a national priority, the Chinese government launched a new round of healthcare reform in 2009. It is an unprecedented health system transformation towards Universal Health Coverage. Following extensive interagency consultation and public debates, this launch emphasized a return to government-led, people-centered healthcare and healthcare as a public good (Tao et al., 2020). The latest round of healthcare reform adopted the ‘best fit’ with the existing institutional and policy frameworks towards achieving UHC by an incremental approach (step by step), which was recommended by the WHO team.

In 2009, China launched an ambitious health system reform that combined extending social health insurance scheme with improving efficiency, access and quality of care in the country. The result showed that the reform has had negative effects on productivity. Only scale efficiency had improved steadily, but the decline in the scale of technological change observed during the same period meant that the progress in scale efficiency had been masked. Better economic performance - as measured by per capita Gross Domestic Product (GDP) - and higher human resource to capital investment ratio (as measured by density of medical staff per hospital beds) tended to boost productivity growth, while population aging, low educational attainment and higher percentage of out-of-pocket payments had adverse effects. Improving health system

productivity in China requires improving financial risk protection and maintaining proper balance between human and capital investment in the country.

This study identified four key stages that public health experienced in China: the initial stage centering on prevention (1949-1978), the stage of deviation with more attention to treatment but little to prevention (1978-2003), the recovery stage after SARS (Severe Acute Respiratory Syndrome) Crisis (2003-2009), and the new stage to an equitable and people-centered system (2009 up to now). In the latest stage, the National Basic Public Health Service Program is implemented to respond the threat of noncommunicable diseases (NCDs) and has achieved some initial results, while there are still many challenges including service quality, poor integration among service items and IT system, lack of quality professionals and insufficient intersectoral endeavor (L. Wang et al., 2019).

According to Guo et al. (2010) , three major metrics challenges must be met to ensure that the health reform is more successful than previous efforts: 1) The quality and comprehensiveness of health metrics need to be gradually improved; 2) the analytical capacity for integrating several types of data from national surveys, facility-based routine reporting, and national disease surveillance needs to be strengthened; and 3) the traditional top-down process for policy formulation needs to become increasingly evidence based, driven by the commitment of decision makers to make use of available information. These authors provide an introduction to health development and different phases of healthcare reforms in China. The first round of healthcare reform began in the early 1980s, focused on holding hospitals fiscally accountable. The second round, aimed at balancing social and economic benefits, started in 1996. The third round began in 2007 and called for reducing individual medical care burdens.

A critical reading of the available evidence suggests that current health service delivery in China leaves room for improvement, in terms of quality, responsiveness to patients, efficiency, and equity. Finally, we conclude with some observations about how further analyses could most contribute to strengthening the evidence base of healthcare delivery policy in China. Probably the greatest need is for investment in better micro-level provider data sets. Improved measures of quality and patient case-mix will be vital for comparing performance of providers, both across markets and over time. To study the rich tapestry of local quasi-experiments unfolding in China, researchers need to identify appropriate comparison groups and control as much as possible for confounding factors when estimating the impact of reforms. Eventually it should be possible to analyze a nationally representative sample of patients and providers, such as by linking national health survey household data to facility-level data and patient claims, and to use detailed process and outcomes data to study overall productivity or social value (i.e. the

value of improved patient outcomes, net of resource use). With these better data, rigorous evaluations can provide sound evidence about which policies are most effective in improving Chinese healthcare delivery.

Since the Chinese government implemented the Reform and Opening Policies in 1978, its economy has been growing so quickly that it has become the second largest economy in the world. However, the living conditions of the Chinese people are not at the corresponding level. A large gap exists between the development of economics and people's well-being, like healthcare, education, or the environment's quality. Among these, the healthcare issue is turning into a serious problem in society. Expensive medical bills and difficult access to adequate medical services have been issues of concern in China recently.

The root cause of this problem is the lack of medical resources and the uneven distribution of these resources. The population of China, which is more than 1.4 billion, accounts for more than 22% of the world population, but its healthcare investment only makes up a 4.5% portion of the world's total, and the medical staff represents only 13%. Making matters worse, nearly 80% of these scarce medical resources are centralized in large cities, and 80% of them in these cities are located in a few large hospitals. The clinical facilities in communities and rural areas get little investment, and they are seriously lacking medical staff and equipment. This kind of ill-balanced distribution has crippled the function of small community clinics. To solve this problem, the Chinese government is pushing forward the New Healthcare Reform (Zheng & Rodríguez-Monroy, 2015).

Moreover, China's aging population is speeding up, and the scope of chronic disease groups is gradually expanding. At present, there are more than 300 million people, putting forward higher requirements for the health care system. At the same time, the income level of Chinese residents has continued to improve, the standards and levels of medical and health services have also improved, and the corresponding expenditure has also increased significantly. These factors have supported the expansion of medical demand and promoted the development of related industries. According to the consulting data of AIDS Media, the revenue scale of China's massive health industry has increased from 2.5 trillion RMB in 2014 to 7 trillion RMB in 2020, showing a significant acceleration. However, compared with developed countries, there is still a big gap. According to China's Bureau of Statistics (IImedia, 2021), the proportion of medical and health expenditure in the United States, Germany, France and other countries in GDP exceeds 10%. The average proportion of OECD countries is 8.8%, while China's current proportion is 6.6%. Considering the size of China's economy, the medical and health industry still has much room for development.

The public healthcare system of China has witnessed a series of reform since the 1980s, with considerable impact on the working conditions and well-being of its nursing workforce (Cooke & Zhan, 2013). However, contemporary healthcare systems face several challenges among which shortage and low satisfaction of health professionals. These are important issues as e.g. satisfaction and motivation of medical staff is crucial for their stabilization and quality work-medical performance.

These challenges fall within the scope of HRM that has been evolving to prevent and turnaround this situation worldwide (Boselie, 2010; Harris et al., 2007; Yun et al., 2022). The positive impact of HRM practices on increasing employee satisfaction and engagement is scientifically proven. According to Chai et al. (2019), in 2009, China launched an ambitious health system reform that combined extending social health insurance scheme with improving efficiency, access and quality of care in the country. The result showed that the reform has had negative effects on productivity. Only scale efficiency had improved steadily, but the decline in the scale of technological change observed during the same period meant that the progress in scale efficiency had been masked.

Why are healthcare organizations so difficult to manage? Few if any countries are satisfied with their health systems (Glouberman & Mintzberg, 2001). As a result, reforms are being contemplated worldwide to make health organizations more responsive to user needs as well as more financially accountable. Although highly dependent on technical equipment, facilities and proper resource management, being fundamentally driven by service, healthcare is an industry that is mostly dependent on qualified human resources. Therefore, a growing body of research has drawn attention to the potential of HRM to address these issues. HRM can help enhance the performance of health services, by impacting on the efficiency and effectiveness patient care delivery. In theory, imperatives to reduce the costs of service provision and improve the quality of care, combined with the human-capital intensive, high-skilled and high-impact nature of health service delivery, make healthcare an ideal context in which HRM can make a contribution. Currently, HRM practices in healthcare are used in a limited way, often only at the level of HR or labor law and union bargaining. This is indicative of the low level of HR development. It is desirable to make full use of HRM practices in healthcare (Blštáková & Palenčárová, 2021). HRM is an important factor driving the development of the medical and health industry. Major breakthroughs in HRM often bring rich returns to investment. Due to increasing cost pressures, and the necessity to ensure high quality patient care while maintaining a safe environment for patients and staff, interest in the capacity for HRM practices to make a difference has piqued the attention of healthcare professionals (Shantz et al., 2016).

There is growing awareness that HRM practices can produce positive outcomes for healthcare organizations. It is imperative for organizational decision makers and HRM practitioners to know where to focus their efforts. Research has been showing that focusing on relational HRM practices, such as increasing employee participation in decision making and opportunities for development are particularly useful in the healthcare context as they increase engagement (Boselie, 2010). As expected, as healthcare workers reported engagement in their roles, quality of care, and safety perceptions increased (Attridge, 2009; Nahrgang et al., 2011; Wee & Lai, 2021). Shantz et al. (2016) expected that the relationship between engagement and quality of care and safety was stronger for nurses, relative to administrative support staff. This is because nurses have a closer relationship with those who benefit from their work. Grant's (2007) theory of prosocial motivation suggests that employees become intrinsically motivated by their work when they see the impact that their work has on others; the more physically and psychologically close employees are to those who benefit from their work, the more motivated they become. Since nurses are in day-to-day contact with patients, they are more intrinsically motivated, leading to a stronger relationship between engagement and quality of care and safety (Shantz et al., 2016).

This shifting focus towards HRM occurs simultaneously with mounting pressures on public healthcare organizations. These have increased dramatically in the recent past and currently healthcare organizations are tasked with balancing quality care with efficiency, while ensuring that patients and staff operate in a safe environment. One way to meet these ends is to retain an engaged workforce. Importantly, the strength of the relationships between HRM practices and outcomes, via engagement, differed depending on whether an employee was a nurse or an administrative support worker. It may therefore behoove healthcare organizations to take a tailored approach to HRM for different occupational groups (Shantz et al., 2016).

Based on current knowledge about HRM in the healthcare, some scholars found that a proven relationship between more sophisticated human resource practices and healthcare quality. Research findings highlight the need for a focused improvement on the functioning of relevant HRM systems in healthcare as one of the factors for improving patient care (West et al., 2006).

The quality of healthcare and the level of medical performance in China have long been undermined by a shortage of healthcare personnel and the poor readiness of health care managers to manage people. Research suggests that the key challenge of human resource management systems in healthcare in China is attraction and retention. The way to build the attractiveness of the health profession and eliminate the departure of China health professionals

abroad is quality human resource management in its mature stage of development. Furthermore, defining and communicating the value of the employee experience of working in healthcare is important.

According to Jankelová (2021), it is the leaders who play a key role in creating the organizational conditions in which a developed HRM system can be implemented. Here we see the role of management education of healthcare employees, which does not remain only at the level of the University curriculum, but continues further on the job. We see the quality of human resource management in hospitals as the foundation of quality healthcare.

2.2 Healthcare HRM challenges in China

2.2.1 Attracting and recruiting the right number and professional skills profile

The changing business scenario and vigorous talent hunting emphasize the demand for new recruitment strategies (Potočník et al., 2021). In this case, the importance of human resources in any organization is increasing. Its strong influence on the return on investment and the company's success in the market attaches importance to effective recruitment strategies from the perspective of individuals, organizations, and society, thereby improving the organization's return on investment and economic feasibility (Hansen, 2018; Sangeetha, 2010). When mentioning that effective HR management leads to higher performance (Agarwal et al., 2021), this can mean that it can quadruple performance, as shown in a study of more than 600,000 researchers, entertainers, politicians, and athletes conducted by O'Boyle Jr and Aguinis (2012) that found that high-performance productivity is 400 percent higher than average.

Recruitment and attracting talent are still challenging for executives (Potočník et al., 2021; S. Harvey, 2014) and as the world economy is threatened by an economic recession, it will come to the forefront again. In order to help recruiters face challenges, Weitzel et al. (2009) provide a four-quarter framework that divides recruitment activities into two-dimensional activities-recruitment, time standards, and scarcity of required skills. Adeosun and Ohiani (2020) explore the drivers of attracting and recruiting quality talents. Also, the role of policies including the national labor laws, industry norms and localized firm policies have on hiring practices and drivers in a developing country. And they find that digitization is a vital strategy leveraged on attracting and recruiting quality talents. Techniques such as the use of social media, traditional media, online interviews, physical interviews have proven to help in selecting quality talents.

A central issue in recruitment concerns job description. Lin and Kleiner (1999) analyzed jobs to obtain an accurate occupational description. Analyzing jobs entails gathering data about particular jobs and the things people do to succeed in those jobs by asking employees to describe actual behaviors that led to either success or failure on the job. Garcia et al. (2003) also use 'Define the Job, and describe the ideal candidate' to attract and recruit the right person. The difference is that they interview and test applicants to find a helpful signal to choose the right person. One of the emerging dimensions concerns thinking in a complex manner that matches the emergence of modern complex systems that usually exacerbate the diffusion of information and the complexity of technology. Therefore, in recruitment, providing methods and techniques that count on individuals' systems thinking skills is essential to guarantee a better fit with their organization's requirements and objectives (Karam et al., 2020).

Recruitment aims to collect the appropriate and qualified candidates at a minimum cost to meet the organization's needs. In addition, recruitment also includes vacant positions, primary responsibilities, necessary experience, education qualifications, salary structure, work type, and any special conditions to define the recruitment process. The recruitment process begins with identifying the number of vacancies and advertising. The organization evaluates and uses the most suitable source of applicants to attract the most suitable candidate through identification and use. Studies involving attracting and recruiting the correct number and professional skills profiles have been frequent in the international literature, probably because most units and job seekers use at least one or a few social networking sites' homepages, and social media use has become more frequent during the job search and recruitment process (Headworth, 2015; Koivunen et al., 2019; Wazed & Ng, 2015; Yasir et al., 2021). During the job search process, recruiters and job seekers will need to understand how to effectively use social media, so the importance of social media as the application of information sources is increasing.

Furthermore, Van Zyl et al. (2017) mapped out key dimensions which are essential for the implementation of talent management. The dimensions of talent management are attraction, sourcing and recruitment, deployment and transition, growth and development, performance management, talent reviews, rewarding and recognizing, engagement and retention. Alexander et al. (2019) assessed the differences in the evaluation of social media activities, types, and effectiveness of recruiters and job seekers. They found that recruiters are more pessimistic about unreliable social media evaluation, and job applicants are not so active in the content that may be favorable for job search, which reflects the departure between the two. Based on this it is reasonable to state that recruiters that do not use social media tools like LinkedIn, cannot perform effective recruitment. Therefore, training in using social media is essential (Koch et

al., 2018). This study indicates that LinkedIn has a major impact on recruitment, but that social media is not a panacea for recruitment issues. In short, effective recruitment strategies have caused and attracted a strong labor force. Its talent and supreme labor force have created competitive advantages and unparalleled business success.

Choosing capable and compassionate medical staff is an increasingly important issue internationally. Traditionally, most research on selection in healthcare has focused on exploring the quality of selection methods using primarily student populations (Hecker & Norman, 2017). In recent years, the field has progressed to potentially more complex topics, including selection policies and systems design, methodological concerns, diversity and fairness issues, new evaluation frameworks, and developments in theory (Patterson et al., 2015). Moreover, in evaluating professional exams, the validity and reliability of the assessments is considered the gold standard.

Roberts et al. (2017) found favorable psychometric evidence for multiple mini-interviews, situational judgment tests, and clinical problem-solving tests, although most of the evidence was limited to the United Kingdom. China is rapidly expanding its general practitioner (GP) workforce as part of recent healthcare reform, with an extra 400,000 GPs by 2030. According to this background, Chen et al. (2022) conducted a scoping review of literature in recruitment of GPs in China to find that within a set of variables that explain GP attractiveness (namely, individual background, compensation and benefits, career, work environment, self-fulfillment, and understanding national supporting policies paired with their impact in developing organizational structures) it is compensation and benefits together with work environment those that matter the most.

2.2.2 Retaining the right employees

While pay and benefits matter, managers cannot count on the money to retain talented people with employment options (Jordan-Evans & Kaye, 2002). Retention is difficult to focus on because so many factors affect it, and organizations cannot easily change all of them. Even so, a well-conceived plan of action can greatly enhance progress toward long-term retention improvements (Bernardin & Beatty, 1984). Unfortunately, many organizations have failed to make a concerted effort to implement changes. Therefore, key motivators include challenging and stimulating work, a chance to learn and grow, a good boss, and great people to work with.

Managers can influence these major retention factors. The problem is that many managers do not believe they have the power to hang on to their best and brightest (Araslı & Arıcı, 2018). Talent management is a strategy and an overall method for human resources management aimed

to improve organizational effectiveness. Research has shown that truly talented people tend to gravitate towards the best organizations and Van Dijk (2008) made the case for those aspects that characterize best organizations, namely those that instill the talent management mindset at all levels, those who integrate talent management in their recruitment strategies and those who grow their leaders. Talent management is intended to improve the performance and potential of talents, because they have important leveraging effects upon the organization in the short and long term. In health care, the ability to quickly screen, hire, and onboard talented medical personnel will affect patients' well-being.

Both recruitment and retention in the healthcare industry must remain a top priority as replacing a talent has an estimated cost between 70 to 200 percent of the annual salary (Kaye & Jordan-Evans, 2001). Managers are vital in retaining their healthcare professionals, as management practices can significantly influence turnover intention. Supervisors must pay attention to staff needs and help create a positive work environment. The current business and economic environment are exposing many weaknesses in many organizations' talent management practices, as well as the comprehensive understanding of skills, capabilities, compulsory labor, and top talents (Keller & Meaney, 2017; Khatri et al., 2010). Retaining and attracting talent will require a renewed focus and energy on employee value propositions, with greater flexibility to attract increasingly diverse talent. Responsible and sustainable businesses will play an increasingly important role in the environmental, social and economic responsibility (Cheese, 2010). Araslı and Arıcı (2018) developed a new leadership model which could help to understand how to retain seasonal employees in the hospitality industry. They divided seasonal employees into three types using semi-structured interviews and document analysis (suspended employees: Type-A, seasonal trainee: Type-B, and spoon-feeding employees: Type-C). Moreover, social support at work is vital to personal health, well-being and employees. Although this may not apply directly in healthcare settings, it shows how critical leadership can be in employee retention efforts.

Another critical factor is the work environment, expressed in co-workers' mutual support. Evidence shows that employees may be more willing to support colleagues who have established friendships with them or if they think support will be rewarded (Nahum-Shani & Bamberger, 2011). Holland and Collins (2022) conducted in-depth interviews with workers employed when diagnosed with rheumatoid arthritis, an inflammatory and progressive musculoskeletal disorder, to explore how rheumatoid arthritis affects work relationships, the willingness of employers and co-workers to offer support and the importance of support for continued employment after rheumatoid arthritis onset. So, it is in the organization's best

interest to promote a working environment that relates to the beliefs and values of the organization (Emanuele & Higgins, 2000). Organizational performance is the essence of an industrial enterprise's existence. Therefore, achieving results and maintaining and developing an enterprise's potential employees are essential in terms of performance. When assessing performance, management should also consider organizational success in managing human resources and developing human resources potential.

Learning and development of talented employees have become a mainstay for organizational success. Neupane (2015) studied the effect of coaching and mentoring on employee performance in the UK. Furthermore, the loss of nurses through voluntarily leaving nursing practice has not attracted much attention in China. However, there is a lack of an effective way to understand and communicate nursing workforce mobility in China and worldwide Zhu et al. (2014). These authors conducted a qualitative study on nurses that left nursing to find two large reasons: mismatched individual-organizational expectations (entering with unrealistic expectations, idealized workplace, losing confidence in quality and safety of healthcare) and individual perceptions of power (lack of autonomy or subordinator to medical staff, devaluation of nursing work, insufficient personal freedom or too much organizational control). Consequently, expectations play an important role in retaining the right employees, which cannot be attained without effective communication.

2.2.3 Evaluating performance

We can divide the previous performance evaluation literature in the field of healthcare into three levels according to the evaluation objects. First, we can take the whole hospital as the evaluation object (Chow-Chua & Goh, 2002; Li et al., 2012); Second, we can take the hospital departments as the evaluation object (Fanti et al., 2013); Third, we can take individual hospital staff as the evaluation object (Shi et al., 2018). Because our focus lies in human resource management in the medical industry, the performance evaluation here is mainly aimed at the staff of the hospital, which means to measure the work and results of the staff according to their job responsibilities.

Performance evaluation of medical staff plays an important role in human resource management of medical industry. On the one hand, the use of unreasonable performance evaluation methods such as overly strict performance evaluation will increase the psychological pressure of medical staff, leading to their mental and physical health problems (Fan et al., 2014; Wang et al., 2020; M. Zhang et al., 2013), and affect the subsequent work performance. This can have a bad impact on the patient and the hospital. On the other hand, unreasonable

performance evaluation methods such as too slack performance evaluation methods will cause insufficient incentives and make employees slack off, which is not conducive to the healthy development of the hospital and will have a negative impact on the hospital's reputation.

Appropriate performance evaluation is essential for improving the work motivation and creativity of medical staff. It is also vital for enhancing the overall quality of nursing and management efficiency of hospitals. Furthermore, such performance evaluations can lead to an improvement in patient satisfaction with medical services. Therefore, hospitals need a scientific and reasonable performance evaluation system.

The establishment of performance evaluation index is important and challenging. It is difficult to establish objective, comprehensive and scientific performance evaluation indicators. There are many medical performance evaluation indicators in foreign countries (Ozcan, 2008), but hospitals in western countries and Chinese hospitals have different constitutions and stages of development, so the experience of establishing performance evaluation in western countries is only a reference for Chinese hospitals. Performance evaluation index systems for medical staff must be consider the specific nature of hospitals (Li et al., 2012). For example, S. Wang et al. (2019) drew inspiration from international practice of medical performance evaluation and believed that when optimizing the performance evaluation system of medical staff in China, assessment indicators of disease prevention and health management could be emphasized.

At present, some Chinese hospitals have not established a reasonable and complete performance evaluation index system, which leads to the low enthusiasm of medical staff and seriously hinders the improvement of medical staff ability (Gao et al., 2018). Even if some hospitals have established the performance evaluation index system for medical staff, there are still many problems, such as the ion index not being consistent with the training of medical personnel and the overall strategy of the hospital, the performance evaluation index system lacks the incentive effect and cannot stimulate the motivation of medical staff (Li et al., 2022). To avoid this problem, hospital managers should fully understand which work in medical activities can best reflect the value of medical technology and labor, and master which links are the key and difficult points in medical activities. Only in this way can they develop an operable, reasonable and efficient performance evaluation index system, alleviate the shortage and waste of medical staff, and improve the quality of care provided to patients.

While the establishment of performance evaluation indicators is critical for improving the quality of health care, there are also significant challenges in the implementation of these evaluations. For example, some hospitals may lack an adequate supervision process for performance evaluation and may also lack a feedback mechanism for evaluation results. These

shortcomings can undermine the effectiveness of performance evaluation systems and result in low motivation among medical staff. In this regard, some scholars have proposed the establishment of a performance accountability system that incentivizes high-quality, high-value care (Li et al., 2020). Such a system could provide a clear framework for medical staff to understand what is expected of them and the rewards for meeting or exceeding these expectations. It could also offer feedback and corrective actions to those who do not meet the standards set by the hospital

The lack of a robust performance evaluation system can lead to reduced work enthusiasm among medical staff, which can negatively impact the quality of health care. Therefore, hospitals must ensure the effective implementation of a performance evaluation system with adequate supervision, feedback mechanisms, and incentives for high-quality care. While the implementation of performance evaluation systems is critical for improving the quality of health care, the establishment of such systems presents significant challenges. To ensure the success of performance evaluation systems, hospitals must establish an effective feedback mechanism, supervision process, and a performance accountability system that incentivizes high-quality care.

In conclusion, performance evaluation is a critical and challenging task that requires scholars and hospital managers in the field of medical human resource management to learn from domestic and international scientific research and practical experience continually. They must explore more reasonable performance evaluation methods that consider the specific nature of hospitals, establish comprehensive and scientific performance evaluation indicators, and implement performance accountability systems that incentivize high-quality and high-value care. Only in this way can we improve the overall nursing quality and management efficiency of hospitals, enhance the work enthusiasm and creativity of medical staff, and improve patient satisfaction on medical services.

2.2.4 Aligning staffing needs with staffing practices

Aligning staffing needs with staffing practices is an important topic in healthcare HRM. It may pertain to how many people are allocated to one department compared to the required number of people. Aligning staffing needs with staffing practices reflects the principle of balance between supply and demand. The principle of supply and demand balance refers to the allocation of human resources in a reasonable way so that the supply and demand of human resources in the whole system and branches can reach a balanced state (Jiang & Zhu, 2015).

The mismatch between staffing needs and staffing practices can have many adverse effects. When the staffing numbers exceeds the staffing needs, it will lead to the low enthusiasm of medical staff and the waste of medical resources. In China, there are still many areas lacking adequate medical resources (Xia et al., 2021), so avoiding the waste of medical resources should be a priority. When staffing numbers fall short from staffing needs, medical staff will assume excessive workload, which will make them feel tired and stressed, and have a negative impact on their work performance, and also make them more willing to quit (Van Bogaert et al., 2017).

The above content mainly introduces the adverse consequences of the mismatch between quantitative staffing needs and staffing practices. Similarly, the mismatch between qualitative staffing needs and practices will also have a negative impact on hospitals. Lack of qualified medical staff is a very common problem in countries around the world. For example, studies have estimated that about 6% to 12% of doctors in the United States are not qualified for their jobs. Data from Ontario, Canada, showed that about 15% of family doctors and 3% of professional doctors were not competent for their work (Grace et al., 2014). In Netherlands the estimated percentage of physicians that have poor performance was reported as 5% (Van den Goor et al., 2020). This undoubtedly proves that the recruitment effort is a failure and the hospital needs to bear the cost of re-recruiting. In addition, health care workers who are not competent to do their jobs can also reduce the quality of care and patient satisfaction. As a result, hospitals need to carefully check candidates' skills to see if they match the job requirements.

At present, China's demand for health services far exceeds the supply. With the improvement of people's living standards, health awareness and health insurance coverage, people's demand for medical and health care has also increased significantly, but the growth of the number of professionals is far behind the growth of service demand (Wu et al., 2016). This is not good for the improvement of medical quality and the long-term development of hospitals. From the perspective of the number of medical personnel, previous literature revealed the problem of insufficient medical personnel allocation in some Chinese hospitals, which will affect the medical quality and patient satisfaction, and even pose a threat to the safety of patients in serious cases (M. Zhang et al., 2015).

Some studies focus on the staffing of nurses (Yun et al., 2010; L Zhang et al., 2021). Some scholars believe that adequate staffing of nurses has certain benefits, and it is found from the data that more nurses have a statistically significant positive impact on the confidence of patients' self-care ability after discharge and patient satisfaction. That is, better staffing levels may be an effective strategy to improve patient outcomes (Zhu et al., 2012). Some scholars

have also paid attention to the low level of nurses at night, and suggested that the Chinese government should formulate standards for nurses in different periods and departments, so as to guide hospitals to rationally allocate nursing resources, improve work efficiency, improve nursing quality and maintain patient safety (Shen et al., 2020).

In addition, China is faced with the problem of population aging (Lee, 2004). In China, the nursing industry of the elderly has not been developed yet. In the past, nursing may mainly focus on the physical needs of the cared for, rather than their emotional and psychological needs. In the future, hospitals may need to recruit more professional nursing staff for the elderly (Cooke & Bartram, 2015). Moreover, compared with the past, covid-19 revealed the importance of having the right medical resources in Chinese hospitals and promote public trust in healthcare staff (Sun et al., 2021). Therefore, management always needs to timely adjust the objectives and tasks of staffing, and staffing should be in line with the changes in the external environment and internal conditions.

In general, hospital managers need to conduct a specific and in-depth analysis of the staffing needs and staffing practices of hospitals to find out the problems in the allocation of human resources in hospitals. When staffing needs are inconsistent with staffing numbers, hospitals need to adjust quickly in determining whether further recruitment is necessary. Only in this way can hospitals maintain long-term healthy development.

2.3 Staffing management

Staffing management policies are significant for organizations to attract, recruit and retain the right number and professional skills employees (Becker et al., 2009). A good staff management policy can not only contribute to the success of the organization but also improve employee satisfaction. However, inefficient staff management may incur in staff loss which inevitably results in inadequate staff, and thus, the organization would face a severe working environment (Van Bogaert et al., 2017). For healthcare organizations (e.g., hospitals and health committees), the pressures have increased dramatically in the recent past (e.g. (Jiang & Zhu, 2015)). Healthcare organizations are tasked with balancing quality care with efficiency while ensuring that patients and staff operate safely.

Career development opportunities have a direct impact on the employee's career prospects, especially with the current management system within the employee's compensation, rank, title, and the performance bonus distribution are also associated with rank and title. Career development is not only intended to provide opportunities for employees to obtain higher career

paths but also to provide more responsibility and appreciation for the efforts made by employees (Modestino et al., 2019). So, it is essential to employees to have a job development plan, which has a direct impact on individual and social development.

When organizations cannot meet these developmental aspirations, individuals tend to react with a more depressive state, burnout, and other psychological negative phenomena. If there is no hope for career development, there will be a sense of lack of survival, a sense of loss in career, a sense of mental fatigue, and a sense of cognitive conflict, which will result in the conflict between the internal needs of human psychology and the objective reality. Research shows that training can improve employee work performance which in turn can improve the employee's career development. Companies that often conduct training for employees will increase employee work performance and employees will be more motivated to work so that the company goals can be achieved (Niati et al., 2021).

The rapid development of China's institutional reform and the deepening of the integration of government functions have an increasing impact on the career development of employees and have a particular impact on the daily work of medical healthcare workers. In China, the nursing care services for elder population has not been developed yet. In the past, nursing may mainly focus on the physical needs of the cared for, rather than their emotional and psychological needs. In the future, hospitals may need to recruit more professional nursing staff for the elderly (Cooke & Bartram, 2015). Therefore, Organizational decision-makers and HRM practitioners must know where to focus their efforts.

Research has shown that focusing on relational HRM practices, such as increasing employee participation in decision-making and opportunities for development, is particularly useful in the healthcare context as they increase engagement (Boselie, 2010). As expected, as healthcare workers report engagement in their roles, quality of care and safety perceptions increases (Attridge, 2009). Current health service delivery in China leaves much room for improvement in quality, responsiveness to patients, efficiency, and equity. Moreover, compared with the past, covid-19 revealed the importance of intensive care management in Chinese hospitals and promote public trust in healthcare staff (Phua et al., 2020).

When mentioning that effective HR management leads to higher performance (Agarwal et al., 2021), this can mean that recruitment aims to collect the appropriate and qualified candidates at a minimum cost to meet the organization's needs. In addition, recruitment also includes vacant positions, primary responsibilities, necessary experience, education qualifications, salary structure, work type, and any special conditions to define the recruitment

process. Significantly, choosing capable and compassionate medical staff is an increasingly important issue internationally.

Traditionally, most research on selection in healthcare has focused on exploring the quality of selection methods using primarily student populations (Hecker & Norman, 2017). Moreover, performance evaluation is an essential and challenging work that requires the integration of conceptual theory and practical experience (Anwar & Abdullah, 2021) and constantly exploring more reasonable performance evaluation methods. The establishment of performance evaluation index is important and challenging. However, it is difficult to establish objective, comprehensive, and scientific performance evaluation indicators. S. Wang et al (2019) drew inspiration from the international practice of medical performance evaluation and believed that when optimizing the performance evaluation system of medical staff in China, assessment indicators of disease prevention and health management could be emphasized. Although China has taken a series of measures to deal with the staffing problems in the medical industry, there are still some unsolved problems, such as the shortage of medical professionals in China from the perspective of personnel capacity.

Staffing management is deceitfully a simple issue because it refers to a straightforward function of HRM (finding suitable people to feed job posts) but it entails a complex set of dimensions one has to attend to. As stated by Park (2018) one has to attend to staffing the right number of workers as well as with the right profile, i.e. the correct set of skills to perform well the job. Staffing management can be expressed at the policy level (as a set of guiding principles that align the practices), and the operational level (the practices themselves). It is yet unclear which dimensions staffing management policies should use to guide the decisions, yet literature offers some insights on this.

2.4 Towards a staffing management process model

This section aims to delve into the conceptual and theoretical proposals in literature that relate to staffing management. Specifically, the focus will be on examining the role of staffing policies and management in hospitals, and why they are crucial for enhancing overall hospital management effectiveness.

The literature review will then progress to explore the quantitative dimension of staffing, and how it can impact not only work performance but also significant psychological states, such as work engagement. This section will examine the various factors that influence staffing levels, such as patient acuity and staff skills, and how these factors can impact staffing effectiveness.

In addition to the quantitative aspect, the review will also explore the qualitative dimension of staffing, explaining its nature and importance for professional organizations. This will include examining factors such as staff training, development, and job satisfaction, as well as the impact of these factors on the overall quality of care provided by healthcare organizations.

To conclude the literature review, a conceptual model will be presented that underlies this quantitative empirical study. This model will provide a theoretical framework for understanding the complex interactions between staffing policies, staffing management, and the various factors that impact staffing effectiveness in healthcare organizations. The definition of staffing management policies and the relationship between staffing management policies and staffing adequacy (both quantitative and qualitative), employee engagement, and actual work performance will be developed later in the studies.

Overall, this literature review seeks to provide a comprehensive understanding of the various dimensions of staffing management in healthcare organizations, and how these dimensions can impact overall organizational effectiveness. The findings from this review may have practical implications for healthcare managers, policymakers, and researchers, as they seek to optimize staffing policies and management for better patient outcomes and overall organizational effectiveness.

2.4.1 Staffing management policies

Staffing is arguably the most important practice in HRM because it is a fundamental feature that, if badly achieved, will not be compensated by training, incentives or communication activities in the organizations (Becker et al., 2009). Therefore, we can also notice that staffing consists of two dimensions (Park, 2018): the quantity of employees and the quality of employees, namely, quantitative staffing and qualitative staffing. In this section we focus on the discussion of quantitative staffing.

In this context, quantitative staffing refers to the allocation of the number of employees in an organization. Quantitative staffing inadequacy expresses the degree of inadequate staffing within the organization. An example of a widely studied expression of quantitative staffing insufficiency can be found on 'nursing shortage' studies. This occurs when the demand for registered nurses exceeds the supply and is important because registered nurses constitute the largest proportion of the nursing population and play a significant role in direct patient care (Heinrich, 2001). The shortage of registered nurses has been a problem faced by several countries such as Central/South America, sub-Saharan Africa and South East Asia (Buerhaus et al., 2005). Auerbach et al. (2020) showed the implications of the rapid growth of the nurse

practitioner workforce in the US. The nursing shortage is further aggravated by the retirement of the aging nursing workforce and the changing demographics of the human population. This concept has not been measured in a single way (Buchan & Aiken, 2008) as different measures can be used, including evaluating the nurse-to-patient ratio (McHugh et al., 2021), unfilled nursing positions (Rook, 2022), overtime hours and reliance on supplemental staffing (Nolan & Frishling, 2020). Still, independently of the exact measures adopted, current evidence from these measures suggests that the healthcare shortage is widespread across countries and among medical specialists as is a critical indicator in healthcare research and management.

Staffing management policies are vital because they not only improve hospital quantitative and qualitative staffing inadequacy but also put forward high requirements for human resources. Several reasons may explain why wrong staffing management policies may lead to quantitative staffing inadequacy, for example, staff burnout, employee resignation and insufficient job satisfaction.

Freudenberger (1974) used the new concept and term of “staff burnout” to explain individuals such as medical and health staff and social staff. The long work time and high work labor intensity are evident in the body and spiritual formation. The development process of burnout can be divided into three stages according to a theory developed by a Russian researcher (Boyko, 1999). According to this theory, burnout develops as protective mechanism of the personality and it starts by experiencing a strain phase (stage 1) where a stressful situation lingers and produces traumatizing events that lead to dissatisfaction that creates anxious-depressive symptoms. Cumulating stress will make oneself realize the situation and activate defense mechanisms such as avoiding negative emotions by exposing less to the situation (e.g. reducing the professional duties pressure), reducing emotional reactions which leads to some moral and emotional disorientation. This is the resistance stage. The ongoing resistance erodes one’s own psychological resources which lead to the last stage: Exhaustion. In this stage individuals will show signs of emotional isolation, emotional deficit, depersonalization, and also psychosomatic disorders. As Stoyanova and Stoyanova and Harizanova (2016) note, this theory was developing simultaneously and independently from Maslach’s work (Maslach & Jackson, 1981; Maslach & Pines, 1977) with a striking convergence in signals used to detect it: emotional exhaustion, depersonalization, and loss of personal accomplishment.

Because the theoretical scientific research on the early work career is more focused on the in-depth research on practice, and in the early days of scientific research, theoretical scientific research of doctors' theoretical sciences of work career is more focused on clinical aspects. (NEA, 2022) studies workforce management strategies in times of uncertainty especially in

extreme disaster situations where healthcare professionals need to cope with strong emotions. One of the valued resources is teamwork as teams operate not only as the source of excellent service to those in need but also as an internal support to the team members so to cope with compassion fatigue, a proxy of burnout.

Beeber et al. (2018) show the impacts of nurse delegation policies on staffing and service availability. Psychological intervention is biased towards work career, lacking a scientific theoretical foundation and many experimental research results. During this period, different researchers initially studied questions from corporate employees from various perspectives. Although there was no systemic coherence, it laid the foundation for in-depth research on the diversified research of corporate employees in the future. Maslach and Pines (1977) provides three angle modes for corporate employee questionnaire surveys, namely emotional exhaustion, dehumanization, and lowering corporate feelings, and has a universal and profound social impact. However, implementing psychological intervention services encountered obstacles, as medical staff were reluctant to participate in group or individual psychology interventions (Chen et al., 2020).

Moreover, the experimental research approach has been expanded in-depth, and the research of experts and scholars on psychological issues of HRM increases; it has gradually developed into a systematic and scientific empirical analysis and research stage. Different scholars have given many clinical survey Cases, data analysis, and questionnaire survey data. At this stage, the Maslach Research Center designed a more scientific HRM quantity scale MBI (Maslach Burnout Inventory), including the three dimensions: emotional exhaustion, depersonalization, low personal accomplishment, in a total of 22 items. Malakh-Pines et al. (1981) have also influenced the psychological research of HRM and expands on the psychological concept of corporate personnel due to the psychological nature of coping with being in a long-time pressure climate that depletes emotional and physiological resources.

Since the 1990s, the areas related to the research of HRM have been further expanded, and the scope of corporate research has gradually extended from traditional services in the business service industry to other broader research areas (Jimenez-Andrade & Fogarty, 2019; Pulyaeva et al., 2020). The means are also increasingly scientific and perfect.

Furthermore, the investigation of occupational burnout gradually extended from the United States to other countries, such as China, bringing different cultural backgrounds to the research of the issue (H. Zhang et al., 2020). Rattrie et al. (2019) conducted a meta-analysis which showed job demands and job resources effects upon burnout interacted with five of the six

Hofstede cultural dimensions, thus evidencing the importance of cultural context as a moderator in established burnout models.

Furthermore, good staffing management policies can bring many benefits. First, policies help develop a vision of the future, define short, medium and long-term references, determine objectives, set priorities, delegate roles, and define means of action and institutional arrangements (Cassels & Organization, 1997; Slatten et al., 2021). Moreover, a good policy can support decision-making in the context of greater public awareness of incoherent policies' harmful effects and greater public scrutiny of decision-makers regarding the costs and benefits of proposed options (Peters, 1996; Urbancová & Vrabcová, 2020). The complexity of the healthcare field is another argument that pleads in favor of developing a policy framework for guiding decision-making (Dussault, 2001). Nowadays, hospitals are facing more severe challenges in the management of employees. Based on relevant literature, we find that existing research mainly concentrates on the following two aspects: the problem of loss of employees, the construction of human resource management and incentive policies suitable for hospitals. Several measures also added some new aspects to the concept of burnout. For example, the Spanish Burnout Inventory has four dimensions: enthusiasm toward the job, psychological exhaustion, indolence, and guilt (Gil-Monte & Figueiredo-Ferraz, 2012). Meanwhile, some researchers were concerned that the more neutral wording meant a loss of the specific interpersonal issues for human service workers, so they developed a new measure of interpersonal strain (Borgogni et al., 2012). It remains an open question whether these additional elements are essential components of burnout or whether they assess experiences or conditions that often accompany the experience of burnout.

Current approaches in human resources suggest several weaknesses: a reactive, ad hoc attitude towards human resources problems; dispersal of accountability within HRM; a limited notion of personnel administration that fails to encompass all aspects of HRM; and finally, the short-term perspective of HRM (Dussault & Dubois, 2003; Meskó et al., 2018). Staffing management policies can affect job satisfaction (Judge et al., 2020). To increase job satisfaction, researchers pay more attention to developing a good policy in healthcare hospitals. Moreover, the relationship between job satisfaction and turnover is significant and consistent but not particularly strong (Rajamohan et al., 2019). A complete understanding of the psychology of the withdrawal decision process requires investigation beyond the replication of the satisfaction–turnover relationship.

It is therefore not surprising that the consequences of ill-defined staffing policies may trigger detrimental effects upon employees. These policies may originate shortage of personnel,

which translates into higher workload for each individual. This excessive workload creates stress, negative events and negative working climate that triggers the burnout process. A study conducted by Gutsan et al. (2018) found a direct effect of nurse-to-patient ratio on psychological health and productivity of nurses which also affect the patients' health.

It is well documented that burned-out employees are more prone to voluntarily abandon organizations (Scanlan & Still, 2019) also in search for a better work-life balance (Navajas-Romero et al., 2020) or more meaningful job (Van der Heijden et al., 2019). Policies, expressed as perceived organizational support, may also be conceived as exerting not a direct effect but rather an interaction effect in cushioning negative effects from work stress (Giao et al., 2020).

Therefore, we can hypothesize based on the influences of burnout and satisfaction, that:

Hypothesis 1: Staffing management policies impact the level of quantitative and qualitative staffing inadequacy.

2.4.2 Consequences of quantitative staff inadequacy: team performance

Quantitative staffing inadequacy has gained a central position in the attention given in healthcare HRM management, practice and research. This is evident in its direct relation with increase in workload. Due to the healthcare staff shortage concomitant with mounting numbers of patients and the difficulty of medical treatment, the workload is expected to increase, especially in contexts such as COVID-19 where emergencies are the rule and not the exception. The demand for nursing staff is higher, and the workload of nursing staff is also much bigger in such circumstances. Such workload has potential consequences that are serious and unfavorable alongside with the long work shifts and low control. These have been found to lead to burnout, which has a negative impact on staff and patients (Dall'Ora et al., 2022). Research has found that high loads and long workloads are associated with nurses' reduced productivity, complaints of fatigue, headaches and susceptibility to illness, as well as feelings of depression, negativity and sadness among nurses, which affect not only individual nurses but the entire team (Van Bogaert et al., 2017). Some scholars have also pointed out that in a high-stress environment, it is necessary to reduce work demands and increase work resources to promote long-term work engagement and reduce emotional exhaustion (Garrett, 2008; Opie et al., 2010). Research found that inadequate staffing levels, workload, and working in haste may increase the risk for omissions and other types of error, as well as for patient harm (Härkänen et al., 2019). In addition, other scholars have pointed out that daily exposure to environments with high workload/staffing ratios is associated with an increased risk of death in critically ill patients, and suggested that staffing should be based on workload, not just number of patients,

and even in “Fixing” fewer nurses for a short period of time, or a temporary increase in ICU capacity without a commensurate increase in staffing, may adversely affect patient outcomes (Lee et al., 2017).

In addition, the excessive workload changes the internal psychological perception depleting motivation and decline of motivation and enthusiasm for work, that is, the decline in work engagement and enthusiasm which negatively impact their performance (Agyepong et al., 2004). This is confirmed in research, as researchers found that the eight key characteristics that best predict job burnout are overwork, understaffing, administrative burden, professional relationships, organizational culture, values and expectations, intrinsic motivation, and work life Integration (Adapa et al., 2022). Although the negative effects of quantitative staffing insufficiency upon healthcare professionals themselves is enough to give it attention, the extended negative consequences make this topic even more critical. Such is the case of understaffing severely impacting patient safety, quality of care, and staff outcomes (Ansah Ofei et al., 2021; Maya & Simões, 2011; Papastavrou et al., 2013). High turnover rates, inadequate staffing levels, increasing workload and high stress levels, have been found to hamper the ability to high quality patient care (Oshodi et al., 2019) and this is also related to the staff deteriorating motivation which spills over to lower quality of care and team performance levels (Hui et al., 2012).

Therefore, quantitative staffing insufficiency is rightfully considered to be a critical problem that requires priority attention and intervention. In trying to find solutions, some scholars proposed complete team staffing, turnover among team members, and panel overcapacity had strong, cumulative associations with burnout (Helfrich et al., 2017). Generally, some scholars have pointed out that hospital and nurse managers provide nurses with a supportive environment (with sufficient nursing staff and resources) to increase nurses' work participation/engagement and enable nurses to better perform their work (Wang & Liu, 2015).

The overall goal of staffing is to get the right number and quality of employees at the right time and at the lowest cost. This means that the purpose of staffing is to provide enough qualified human capital, covering the two dimensions of staffing mentioned earlier (the number of employees and the quality of employees), to complete a range of jobs in the organization. It is thus logical that, as one of the functions of HRM, staffing is closely related to organizational performance (Datta et al., 2005).

According to Ployhart (2006, p.868), “staffing is broadly defined as the process of attracting, selecting, and retaining competent individuals to achieve organizational goals”. Through staffing policies, companies recruit and select applicants with higher quality and

universal human capital (Schmitt et al., 1998). Existing studies have shown that implementing effective staffing processes can lead to higher organizational performance (Delery & Doty, 1996). Relating with the previous section, some studies focused on the impact of employee layoffs on performance and found an inverted U-shaped relationship between employee layoffs and performance (Park, 2018).

Performance is one of the most important variables in management and in HRM. The influence of HRM practices on performance has been widely discussed in strategic management and other fields. Studies often measure two types of performance: employee-related performance and market-related performance. There are many dimensions of employee performance and it is difficult to define them using generally accepted definitions (Austin & Villanova, 1992). Bernardin and Beatty (1984) believe that performance is the record of results produced in a specific job function, activity or behavior in a specific time range. McConnell (2003) defines it as an individual's achievements and contributions in practical and quantifiable terms, while Viswesvaran and Ones (2000) think that employee performance includes behavior and individual-level outcomes that are contributive to the organizational performance goals. Borman and Motowidlo (1993) proposed that work performance can be divided into task performance and relational performance. Task performance refers to the behaviors prescribed by an organization or related to a specific job, while relational performance refers to spontaneous behaviors or behaviors unrelated to a specific job. Obviously, task performance mainly measures whether an employee completes the task or not, and it is a core component that reflects the economic benefits of an organization. In the medical situation considered in this paper, the work performance of medical staff is unique. The nursing work of medical staff directly serves a wide range of patients, related to the quality of medical care and patient safety, related to the people's health and medical feelings. Its performance is mainly manifested by the quality and efficiency of medical care services, which is closely related to the health status and satisfaction of patients. The reason why we focus on improving human resource management practices in hospitals is, in the final analysis, to improve the efficiency and benefits of hospital operation and management, and improve the quality and experience of services received by patients. Therefore, work performance is the issue that needs to be focused on.

As for the impact of staffing on performance outcomes, many studies have drawn the conclusion that there is a significant positive relationship between them (Breagh, 1981; Pahos & Galanaki, 2019; Rafii & Andri, 2015; Sutanto & Kurniawan, 2017). A study conducted by Makarem and Al-Amin (2014) found that in hospital settings, adequate nursing staffing levels were associated with better quality of patient care. In the same vein, a study conducted in

neonatal intensive care unit found lower newborn rotavirus infection rates in units with higher nurse staffing levels (Kim et al., 2023). Likewise, staffing levels impact on higher patient satisfaction (Cimiotti et al., 2012). Turner et al. (2022) examined the impact of midwife staffing level in hospitals on postpartum care for women, and found that the higher the staffing level, the more likely postpartum women were to get help and needed information or explanation within a reasonable time, and the less likely they were to be discharged late. Other studies have found that resident staffing levels are also associated with reduced readmission and mortality rates (Al-Amin, 2016; Elliott et al., 2014; Jungerwirth et al., 2013), while inadequate nursing staffing is associated with adverse patient outcomes such as death (Dall'Ora et al., 2022).

Research shows that staffing levels affect workload (Al-Amin & Li, 2019). Unruh (2008) shows that adequate staffing and a balanced workload are central to achieving good results. When staffing levels are inadequate, physicians will face heavy workloads, and higher mental load leads to a delay in information processing (Ryu & Myung, 2005). Therefore, this will lead to resident fatigue, which in turn will negatively affect their performance. In a study of primary health care services provided by the Brazilian health system, Bonfim et al. (2022) found a persistent understaffing of nurses and high workload pressure in most services. In fact, the relationship between staffing level and workload is obvious. When manpower is insufficient, the same number of tasks are allocated to each person, which will inevitably lead to a higher workload for each person. And a higher workload often means a higher time load, a higher mental load and a higher psychological pressure load (Sheridan & Simpson, 1979). Based on the relationship between staffing and workload, some studies focus on using workload indicators of staffing needs (WISN) to estimate the number of employees needed to cope with workload (Bonfim et al., 2022; Knox et al., 2022; Okoroafor et al., 2022).

Some studies use Ability-Motivation-Opportunity (AMO) theory (Jiang et al., 2013) to explain the relationship between staffing and employee performance. The definition of employee performance by Sarmiento et al. (2007) is helpful at this stage. Sarmiento et al. (2007) believe that employee performance is usually the result of at least two aspects: the innate or acquired abilities and skills possessed by employees, and their motivation to use these abilities and skills to better complete the job. So, it very much simply defined as having the skills and also been willing to use them. Based on this definition, the employee performance results are examined from the perspective of AMO theory. According to AMO theory, employees have better performance outcomes when they have both the skills and motivation needed to get the job done, and when their work environment provides opportunities to participate in getting the job done (Boselie, 2010; Koeber et al., 2001). This means that job performance is closely related

to employees' ability, motivation and opportunity to contribute (Armstrong, 2006) and it is also important as it conditions a critical attitude which is staff satisfaction (Cox, 2003; Masoud et al., 2021).

Research indicates that staffing is related to employees' skills, motivation, commitment, work quality, performance and contribution opportunities (Podsakoff et al., 2003). According to this view, quantitative staffing may affect performance by influencing employees' motivation to participate in completing work (Boxall & Purcell, 2016). When the level of quantitative staffing in the organization is insufficient, employees may slack off because of the heavy burden they bear on average, and negative work attitude, which is detrimental to work performance.

From the perspective of Social Exchange Theory (SET) (Blau, 1964; Cropanzano et al., 2017; Homans, 1958), some studies have explained the influence relationship between staffing and performance. Proposed by Homans (1958), SET is a sociological theory that elucidates the social structure of human behavior and its relationships. The theory assumes that all human actors are involved in the exchange of tangible and intangible resources and rewards (Blau, 1964). According to existing research, when employees are treated fairly, they will regard it as a positive treatment by their employer and will repay the organization through positive work attitude (Takeuchi et al., 2007). This means that employees will reward the organization with higher performance if the result of staffing is perceived as a positive treatment.

Studies have shown that better staffing helps to improve nurses' attitude towards work and increase their satisfaction (Cho et al., 2020). However, when the quantitative staffing in the organization is insufficient, employees may face greater work pressure, develop burnout (Dall'Ora et al., 2020) and perceive that they have been treated negatively, which will have a negative impact on their performance results.

From the perspective of resources, some studies regard the number of employees as the resources within the organization to explore the impact of employee layoffs on organizational performance (Park, 2018). When the quantitative staffing level in the organization is insufficient, it can be considered that the resources in the organization are in a state of lack, and therefore, the work performance will be negatively affected and reduced.

Thus, the following hypothesis is formulated:

Hypothesis 2: Quantitative Staffing Inadequacy is negatively associated with perceived team performance.

2.4.3 Consequences of quantitative staff inadequacy: work engagement

As explained before, quantitative staffing inadequacy is a phenomenon of inappropriate personnel allocation in an organization, which often affects the normal operation and has a bad impact on the organization. In a medical context, the consequences of quantitative staffing inadequacy can be quite serious, and it can lead to missed care, potential failure to rescue, job stress, or job dissatisfaction (Simpson et al., 2016). It thus becomes a priority for managers in hospitals to identify and solve the problem of quantitative staffing inadequacy in a timely manner. Healthcare professionals, with particular regard to nurses, are exposed to several job stressors that can adversely affect both their mental and physical health and also decrease work engagement. Work engagement can be considered as the positive opposite of burnout, and it is characterized by energy, involvement and professional efficacy (Fiabane et al., 2013).

All the reported relations between quantitative staff management (inadequacies) and negative outcomes, namely job performance (and subsequently, organizational performance) gather consensus among scholars that have researched this topic. However, the explanative mechanism is still diverse as some authors highlight workload pressure and eventually resource depletion (leading to burnout, (Gutsan et al., 2018)) others highlight the individual perception of not being considerate by managers due to lack of support (Lown et al., 2019) but a strong intervening variable that links staffing inadequacy and job performance (or any other level of performance, team or organizational) is needed further research. We believe, from literature review, that quantitative work engagement is a suitable construct to bridge staffing inadequacy to performance.

Work engagement refers to a positive and complete emotional and cognitive state related to work (Schaufeli et al., 2002), and it is the basic job requirement for employees in many enterprises or professions. The influencing factors of work engagement include individual characteristics such as psychological security and self-efficacy (Christian et al., 2011), and job characteristics such as the richness of work content and the importance of work (Ali et al., 2014), as well as factors related to the organizational environment, such as the management regulations related to the organization, and the organization's attention to individuals.

It is logical that quantitative staffing inadequacy may exert an important effect on the organizational environment that affects work engagement. Previous studies have shown that adequate staffing and balanced workloads are central to achieving good outcomes (Unruh, 2008), which emphasizes the benefits of appropriate personnel allocation. Conversely, quantitative staffing inadequacy may increase the workload of health care workers and lead to

poor outcomes. The stress caused by high workload may negatively affect work engagement. Specifically, the high intensity of work can take a toll on health care workers both physically and psychologically.

For example, Sathiya et al. (2016) believe that the pressure of doctors and nurses is common and a worldwide problem. They found that insufficient personnel and resources are one of the important stressors when assessing the prevalence and sources of perceived pressure of doctors and nurses. Overloaded work may cause too much pressure on medical staff and make them have to ignore some tasks, or they may not be able to complete tasks on time, which will cause great harm to work engagement. There is supporting evidence from literature. For example, Cai et al. (2021) discussed the role of workload and occupational stress in predicting work engagement. They believed that organizational factors including workload would have an impact on work engagement. They stress the importance of ensuring that staff are maintained at adequate levels both qualitatively and quantitatively, to prevent depletion of personal energy and to protect staff from exhaustion. The authors argue that only in this way can healthcare workers cope with the demands of the job. Using a two-level structural equation approach, Ancarani et al. (2018) investigates the links between organizational climate and work engagement in a sample of public hospitals in Italy. Drawing from the Job Demands-Resources model, the model posits a positive association between work engagement and climate promoting worker's autonomy, empowerment, and well-being, whereas it suggests that a climate based on efficiency and goal attainment is not favorable for engagement.

Van Zyl et al. (2017) proved through empirical research that excessive workload leads to emotional exhaustion. Emotional exhaustion may lead to job burnout of medical staff, and then adversely affect their work engagement. Job burnout is a psychological concept, which describes the long-term emotional exhaustion, physical fatigue, reduced work involvement, cold attitude towards clients or low sense of achievement in work.

Revisiting Maslach's definition of job burnout as a comprehensive state, including emotional exhaustion, deindividuation, neuroticism, and low personal achievement, caused by the inability of service industry practitioners to effectively cope with the continuous pressure at work, we can infer that anything that depletes psychological resources may also deplete a sense of being engaged at work (Maslach, 1993).

Kim et al. (2009) proposed that job burnout can be explained as an antecedent variable affecting work engagement. It can be concluded that quantitative staffing inadequacy may increase the workload of health care workers and make them feel stressed and burnout, which may negatively affect the level of work engagement.

By integrating the construct of engaging leadership in the job demands-resources model, Schaufeli (2015) found, with a transversal sample that also has healthcare professionals, that job demands and job resources fully mediate the relationship between engaging leadership and work engagement and burnout.

In addition, the Job Demands-Resources is one of the most commonly used theories to explain work engagement (Bakker & Albrecht, 2018; Bakker & Demerouti, 2017; Bakker et al., 2014). Employees are most likely to engage in work when they are faced with high challenges and have enough work and personal resources to cope with them (Tadić et al., 2014). Therefore, we can infer that when there is quantitative staffing inadequacy, namely insufficient staff, health care workers lack sufficient resources to cope with the challenge of heavy workload, so they may reduce their work engagement.

From the perspective of social exchange theory (SET), it is inevitable that work engagement will decrease when the performance produced by employees is not rewarded accordingly (Cook et al., 2013). Quantitative staffing inadequacy will lead to excessive workload of employees. If the rewards such as salary cannot match the workload, employees may feel unfairly treated, which will further reduce their work enthusiasm and work engagement level.

Dasgupta (2016) examined the impact of organizational, personal, team, and job demand factors on work engagement of nurses, as well as the mediating effects of team and affective commitment. He found that perceived organizational support, leader–member exchange, team–member exchange, workplace friendship had all a positive effect on work engagement. Conversely, nursing role stress negatively relates to work engagement. Mediating effects were found for team commitment, and affective commitment in relating the above-mentioned predictors with work engagement.

Wen et al. (2023) reported direct and indirect effects of empowering leadership on work engagement, through psychological empowerment as well as a boundary condition created cultural orientation. With a large sample of front office employee in hotels in Beijing, findings showed a partial mediation between empowering leadership and work engagement as empowering leadership was directly linked to both the mediator and the dependent variable.

Kartal (2018) conducted a study with a large sample of healthcare professionals to test the effect of work engagement and work alienation on performance. Findings indicate that among work engagement dimensions, it is vigor that has explanative power, leading to higher job performance. Conversely, two of the alienation dimensions (powerlessness and meaninglessness) decrease job performance.

We can also explain the relationship between quantitative staffing inadequacy and work engagement from the perspective of person-job fit theory (P-J fit). Person-job fit refers to the degree to which an employee's personal characteristics match with their job characteristics, including the matching of their knowledge, skills and abilities with the needs of the job and the matching of their needs with the characteristics of the job. Edwards (1991) refined the measurement indicators of person-job fit, including the degree to which an enterprise requires employees' working hours, effort level and related work skills are consistent with their own characteristics. We can speculate that when quantitative staffing is inadequate, employees will take on more workload and require more working hours, which may not match their own characteristics or willingness, and then leads to low work engagement.

Based on the above analysis, we propose that:

Hypothesis 3: Quantitative Staffing Inadequacy is negatively associated with work engagement.

There are many mediating factors that lead to the decline of nursing quality due to insufficient staffing of nursing staff, such as the ability to respond, the use of new technologies and working methods, the ability to monitor patients, the occurrence of adverse events (Neves et al., 2020), but most researchers focus on work in the concept of work engagement. This is in line with previous hypotheses as work engagement is suitably a mediating factor of the performance level decline caused by quantitative staffing inadequacy. Therefore, by joining both hypotheses 1 and 2 in the same model, we reason that:

Hypothesis 4: Quantitative Staffing Inadequacy exerts a negative indirect effect on Team performance via work engagement

2.4.4 The qualitative side of staff inadequacy

As stated, quantitative staffing inadequacies are the first type of staffing problem that arises in the mind of most people. It is without surprise that most literature places an emphasis on this quantitative dimension of staffing. However, qualitative staffing inadequacies can occur even when hospitals have the correct number of people.

Qualitative staffing refers to the skills or qualifications required to exert the profession. Critical shortages of skilled staff are a significant bottleneck in providing timely and quality obstetric care, significantly impacting maternal and neonatal outcomes (Dogba & Fournier, 2009). Lack of sufficient skilled staff plays a dual role in providing timely medical assistance to those in need (Thaddeus & Maine, 1994). These authors proposed three phases of medical service delay that jeopardize the patients' health. Delays are due firstly to the patient's

postponing seek for medical care, secondly due to the difficulty in reaching healthcare facilities, and thirdly due to receiving such healthcare service in the aftermath of entering such facilities. This last phase of delay has been attributed to few skilled staff available to carry out adequate care (Knight et al., 2013; Pouramin et al., 2020). This intersects with resource and equipment shortages that delay the onset of appropriate treatment and leave skilled staff unable to carry out their professional role or to operate to the required standard (Spector et al., 2013).

Therefore, a perfect staffing match to the needs requires the correct number (quantitative) and the right skills (qualitative). The intensity of nursing care, or the intensive effort spent at work (Green & Nguyen, 2001) is important because staffing needs vary with the number of patients and the type of care provided for each patient. As nursing care intensity increases, the nursing staff required to care for patients properly will increase (Moore, 1970). Factors that contribute to the level of intensity include (1) other human resources, such as support staff; (2) physical resources, such as unit layout; (3) the work design and technology, such as the level of computerization and model of nursing care; (4) administrative practices; (5) the severity of the patients being cared for; and (6) the turnaround time to produce the product (patient turnover or throughput) (Allan, 1998; Cavouras, 2002; Chowhan et al., 2019; Cooper & Zaske, 1987; Franken et al., 2021; Yang et al., 2019).

We, therefore, think that the complete depiction of staffing adequacy in organizations requires both types of fit. Both quantitative and qualitative inadequacy can influence job satisfaction and engagement. According to Kahn (1990) and Kahn (1992), a dynamic, dialectical relationship exists between the person who drives personal energies (physical, cognitive, emotional, and mental) into his or her work role, on the one hand, and the work role that allows this person to express him or herself, on the other. As stated, work engagement (Schaufeli et al., 2002) is produced by both having sufficient psychological resources (among which skills as a tool to cope with task and emerging challenges) and reasonable work demands (workload, work intensity, emotional stressors).

Departing from the idea that qualitative staffing adequacy will add up to quantitative staffing adequacy we hypothesize that:

Hypothesis 5: The indirect effect of quantitative staffing inadequacy on team performance via work engagement interacts with qualitative staffing inadequacy in such a way that when qualitative staffing inadequacy is high the negative indirect effect is stronger, but when qualitative staffing inadequacy is low, the negative indirect effect is weaker.

This hypothesis entails two complementary interact effects that, for parsimony's sake, we opted not to formally state as hypotheses. These concern an interaction of qualitative staffing

inadequacy in the relationship established in hypothesis 2 (qualitative staffing inadequacy interacts with the negative direct effect of quantitative staffing inadequacy on team performance in such a way that when qualitative staffing inadequacy is higher, the negative direct effect is stronger) as well as in the one established in hypothesis 3 (qualitative staffing inadequacy interacts with the negative direct effect of quantitative staffing inadequacy on work engagement in such a way that when qualitative staffing inadequacy is higher, the negative direct effect is stronger).

Overall, staff management policies play an important role in healthcare management because they can condition the workforce adequacy to the work demands, both as regards quantitative sufficiency as qualitative fit. If quantitative staffing is insufficient, on the one hand, the external manifestation will lead to a great increase in the workload, which will make the staff feel too much pressure, cannot complete their work well, and is not conducive to ensuring the quality of care, and even seriously threaten the safety of patients. Additionally, not having the right skills will increase the burden of having to perform tasks that require more effort, and may lead also to more errors which are detrimental to the performance of the individuals, and therefore, their team. Better than trying to figure out what the solutions are to remediate the staffing inadequacies, such as rotating team job posts (Helfrich et al., 2017), it is wiser to prevent such need to remediate, by designing good staffing policies.

2.4.5 Conceptual model

Based on the above theory and related literature, we propose a conceptual model involving five dimensions, including staffing management policy, quantitative staffing adequacy, qualitative staffing adequacy, work engagement, and team performance. Based on burnout theory, satisfaction factors, and the researcher's personal work experience, we believe that staffing management policies affect the quality and quantity of staffing, and therefore propose the "Hypothesis 1: Staffing management policies impact the level of quantitative and qualitative staffing inadequacy."

As hospital managers, we know that good staff management can improve employee engagement and thus improve the output of the team. There is plenty theory that guide this topic. Based on the AMO theory, individual behavior and performance is a function of individual ability, willingness to act (motivation), and how many opportunities to participate, meaning that whether an individual will take a particular action depends on whether the individual has the ability, on the individual's desire to act and on how many opportunities the environment can provide. Motivation theory concerns the process of maximizing employees'

commitment to the organization and their work through specific methods and management systems. It is a general summary of principles and methods of how to satisfy various human needs and motivate people. SET (Social Exchange Theory) suggests that all human behavior is governed by some kind of exchange activity that can bring rewards and compensations, therefore, all human social activities can be attributed to an exchange behavior, and the social relationship that people form in social activities is also an exchange relationship. P-J Fit (Person-Job Matching Theory) indicates that the basis for effective allocation and reasonable use of human resources is the man-post matching, the matching of job duties and individual characteristics of employees is the basis, and the matching of job compensation and employee needs to motivate employee behavior is the key, that is, by recruiting the right talent for the position and giving full play to the value of the employee, the employee's talents can be maximized. JD-R (Job Demand-Resource Model) points out that job burnout is caused by the imbalance between job requirements and job resources, and many job resources can compensate for the impact of excessive job requirements on job burnout. Based on the above theories, we proposed Hypothesis 2: Quantitative Staffing Inadequacy is negatively associated with perceived team performance, Hypothesis 3: Quantitative Staffing Inadequacy is negatively associated with work engagement, and Hypothesis 4: Quantitative Staffing Inadequacy exerts a negative indirect effect on Team performance via work engagement.

In 2.4.4, we analyzed the literature on the impact of qualitative staffing inadequacy, but in practice, quantitative staffing inadequacy and qualitative staffing inadequacy usually co-exist, so we innovatively proposed Hypothesis 5: The indirect effect of quantitative staffing inadequacy on team performance via work engagement interacts with qualitative staffing inadequacy in such a way that when qualitative staffing inadequacy is high the negative indirect effect is stronger, but when qualitative staffing inadequacy is low, the negative indirect effect is weaker.

Overall, the integration of the hypotheses produced a conceptual model depicted below (Figure 2.1) and for clarity's sake we list all the hypotheses it includes.

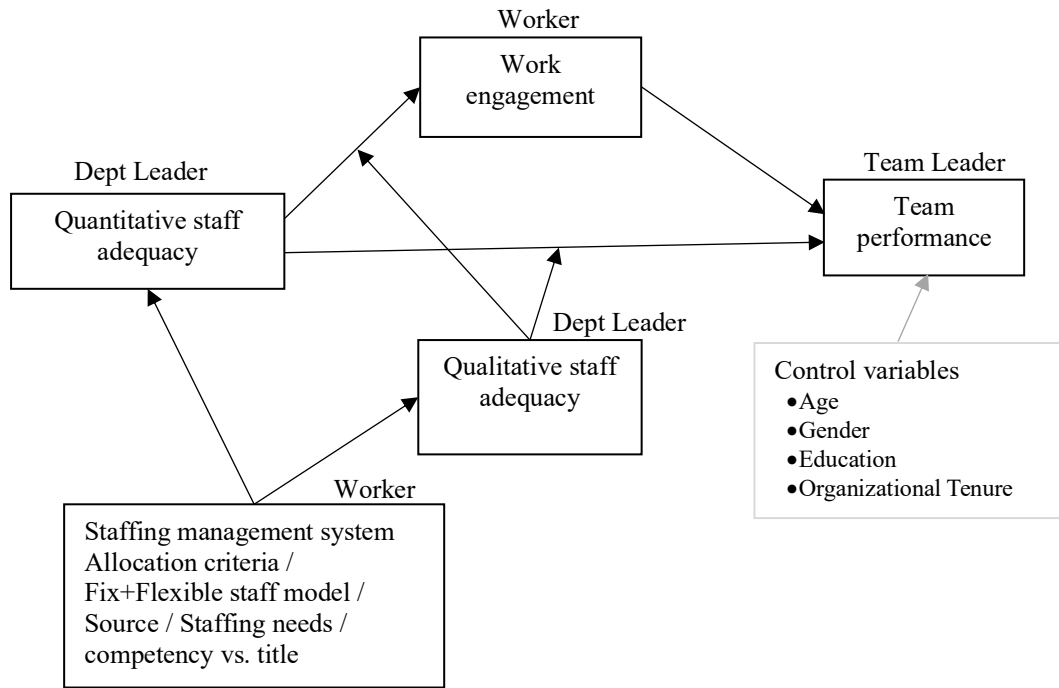


Figure 2.1 Conceptual model

The hypotheses are:

- Hypothesis 1: Staffing management policies impact the level of quantitative and qualitative staffing inadequacy.
- Hypothesis 2: Quantitative Staffing Inadequacy is negatively associated with perceived team performance.
- Hypothesis 3: Quantitative Staffing Inadequacy is negatively associated with work engagement.
- Hypothesis 4: Quantitative Staffing Inadequacy exerts a negative indirect effect on Team performance via work engagement.
- Hypothesis 5: The indirect effect of Quantitative Staffing Inadequacy on Team performance via work engagement interacts with Qualitative Staffing Inadequacy in such a way that when Qualitative Staffing Inadequacy is high the negative indirect effect is stronger, but when Qualitative Staffing Inadequacy is low, the negative indirect effect is weaker.

[This page is deliberately left blank.]

Chapter 3: Study 1 Qualitative Study

This first study is inductive in nature and deploys a qualitative data collection and analysis to explore and understand the organizational setting, to depict the experienced situation as regards headcount and staffing adequacy, but mostly to uncover which dimensions emerge when characterizing staffing management policies. This study is timely because presently, most of the hospital human resources research focuses on the current situation and criteria of human resource allocation, but the research on hospital human resource management policies is not mature, and the dimensions and indicators to describe hospital human resource management policies have not yet been formed. This study investigates the staffing management of one hospital (SZ Maternity and Child Healthcare Hospital) by conducting expert interviews, with the aim of analyzing and summarizing the dimensions and indicators suitable for describing hospital staffing policies, and laying the foundation for a quick and systematic understanding of the current situation of hospital HR allocation and management. We will start by characterizing the organization for which data sources are publicly available such as official websites or the hospital website.

3.1 The organization: SZ Maternity and Child Healthcare Hospital

3.1.1 Organizational overview

Built in 1979, SZ Maternity and Child Healthcare Hospital is a well-known 3A hospital that integrates medical treatment, health care, teaching, research and prevention, and is now the non-directly affiliated hospital of Southern Medical University and the teaching hospitals and internship bases for many universities and colleges.

The hospital has two sites, Hongli Hospital Area and Fuqiang Hospital Area, covering a total area of 35000 square meters, with a construction area of 150000 square meters and 1300 hospital beds. The annual number of outpatient and emergency visits is more than 2 million, the number of discharges is nearly 50000, and the number of deliveries is nearly 20000. At present, a two-tier and three-tier maternal and child health care network has been established, with SZ Maternity and Child Healthcare Hospital as the leader and each district maternity and child healthcare hospital as the support.

The network consists of all the maternity and child healthcare hospitals, general hospitals and community health centers in SZ, ensuring that all evaluation indicators related to maternal and child health in the city continue can be improved, the city's maternal mortality rate and perinatal mortality rate are controlled at the national leading level, and the city's women's and children's health level steadily ranks among the top of the country.

In recent years, SZ Maternity and Child Healthcare Hospital has achieved excellent results in comprehensive performance assessment and evaluation at all levels. The hospital ranks first in the performance assessment of 3A maternal and child health institutions of Guangdong Province in 2020, and ranks the fifth in the first session of national performance assessment of maternal and child health institutions in 2020, which is assessed by the National Health and Wellness Commission. The obstetrics and gynecology department of the hospital has been ranked among the top 100 for many years in STEM ranking of China. Moreover, the hospital has been included in many valuable lists published by a nationally recognized hospital management consulting firm: Guangzhou Ailibi Hospital Management Center. For instances, the hospital was ranked 68th in the "Top 100 Best Hospitals in Guangdong, Hong Kong and Macau Bay Area" and was listed in the "Top 300 Smart Hospitals HIC" in the China Hospital Competitiveness Ranking in 2020, and it ranked 28th in the "Top 50 Maternity Hospitals", 27th in the "Top 50 Children's Hospitals" and 25th in the "Top 60 Smart Hospitals HIC of Specialized Hospitals " in 2021.

This indicates that the hospital has strong technical strength. It created a public research service platform, and formed a full-time research team, which significantly improved the scientific research level. In recent years, the hospital has undertaken a number of major scientific research projects such as the National Key Research and Development Program and the Key Project of National Natural Science Foundation of China, and the provincial and municipal research projects have reached record highs. In recent years, the hospital has won many awards such as the Chinese Medical Science and Technology Award, Guangdong Provincial Science and Technology Progress Award, and Science and Technology Progress Award. In addition, the hospital was awarded the "Typical Hospital of Science and Technology" award by the National Health Care Commission's Medical Administration in 2019 and was awarded the "2018-2020 Demonstration Hospital for Improving Medical Services - Using 'Internet+' as a Tool" by the National Health Care Commission.

The hospital has a complete set of specialties. There are obstetrics, gynecology, neonatology, pediatrics (including pediatric surgery), reproductive medicine center, reproductive immunology, TCM (Traditional Chinese Medicine), acupuncture and massage,

mammary gland, oral disease control center, emergency department, anesthesiology, medical genetics center, laboratory, pathology, radiology, ultrasound, pharmacy, prenatal diagnosis center, women's health department, children's health department, newborn disease screening center, children's hearing diagnosis center, intrauterine disease treatment center, focus ultrasound treatment center, children's neurological rehabilitation center, cervical cancer early diagnosis and treatment center, breast cancer prevention and treatment center, etc. The center has more than 30 departments, such as the Center for Diagnosis and Treatment of Intrauterine Diseases, the Center for Focused Ultrasound Non-invasive Therapy, the Center for Neurological Rehabilitation of Children, the Center for Early Diagnosis and Treatment of Cervical Cancer, and the Center for Breast Cancer Prevention and Treatment, etc. It is officially qualified to operate the third-generation IVF technology (pre-implantation genetic testing technology, PGT).

The hospital has been steadily promoting academic construction, and the influence of specialties is constantly improving. It comprehends one national clinical key specialty: neonatology; one national health care specialty: maternal health care specialty; one high-level clinical key specialty in Guangdong Province: neonatology; two health care specialty in Guangdong Province: neonatal health care specialty and menopausal health care specialty; one key specialty in Traditional Chinese Medicine (TCM) in Guangdong Province: Chinese medicine gynecology; four key medical specialties in municipal level: obstetrics, neonatology, reproductive medicine, maternal and child health care specialty; one key laboratory in municipal level: birth defect prevention and control key laboratory; one TCM specialty in municipal level: Integrated Chinese and Western Medicine Gynecology. Moreover, the hospital has several national bases, such as the first national training base of prenatal ultrasound, national training base of neonatal perinatal medicine specialists, national demonstration base of early diagnosis and treatment of cervical cancer, national demonstration base of early childhood development. The hospital created the first training base of maternal and child medicine with specialty skills, and become the first national training base of advanced life support simulation in obstetrics.

SZ Maternity and Child Healthcare Hospital, as 3A specialized hospital, is among the first batch of training bases for prenatal ultrasound diagnosis technology issued by the Ministry of Health of China, and is the National demonstration base for early diagnosis and treatment of cervical cancer, the National Wu Jieping medical foundation training base for early diagnosis and treatment of breast cancer project, the Training Base of Gynecological Endocrinology and Common Diseases issued by China Maternal and Child Health Association, the National

Demonstration Base of Early Childhood Development, the National Training Base of Neonatal Perinatal Medicine Specialists, the National Clinical Demonstration Base of Focused Ultrasound, the National Training Base of Obstetric Anesthesia, the National Training Base of Neonatal Skin Care, the Nurse Training Base of Neonatal Specialists and Midwifery Specialist in Guangdong Province.

It is also the Midwifery Specialist Nurse Training Base in municipal level, Children's Health Management Demonstration Base, Post-Abortion Care (PAC) Service Demonstration Base, and was awarded the "Quality Care Demonstration Project - Perinatal Maternal and Infant Care Services Training Base" issued by the National Health Care Commission. The hospital is also the collaborative unit of the national standardized training base for resident physicians, the member of the expert committee of the national obstetrics quality control center, one of the eight core medical institutions of the national neonatal specialist medical association, the national demonstration unit of Chinese medicine work in general hospitals, the model maternity school of the China Maternal and Child Health Association, the center for occupational stress and perinatal depression for women in China, the national sentinel unit for safety monitoring of corneal plasticity.

Moreover, it is the Treatment Center of Serious Maternal Illness, the Critical Neonatal Care Center, the Prenatal Diagnosis Special Technical Guidance Center, the Regional Prenatal Diagnosis Center of Guangdong Province, and the Maternal Emergency Critical Care Center, the Newborn Disease Screening Center, the Neonatology Quality Control Center, the Obstetrics Quality Control Center, the Mammography Quality Control Center, the Infant and Child Care Service Guidance Center in municipal level. It is also the Mother-Infant Friendly Demonstration Project Hospital, the Demonstration Hospital for Improving Medical Services, Quality Service Hospital of Post-Abortion Care (PAC) Project, PAC Regional Demonstration Hospital, National Quality Medical Services Demonstration Unit of "Advanced Models for Improving Medical Services", Children's Eye Care Demonstration Unit, and the "Lingnan Luo's Gynecology School Inheritance Working Station".

3.1.2 Human resource overview

By the end of 2021, there were 2214 employees in the hospital, of which 1963 were health technicians, accounting for 88.66%. Slightly more than 22% of the health technicians had senior professional and technical qualification titles, of which 144 were senior high and 296 were associate high. In terms of education background, there were 75 employees with PhD degree and 500 staff with Master's degree, and the number of highly educated talents has been steadily

increasing in the past five years. In 2021, there were 213 new recruits, of which 36.2% had Master's degree and above in education, and 10.8% had intermediate professional and technical qualification titles and above.

The hospital formulates a talent management model that combines talent attraction and talent development. In terms of talent attraction, the hospital introduced 1 "Local-level Leading Talent", 1 "Overseas High-level Talent (C type)" and 1 "Reserve-level Talent" in 2021. In terms of talent development, the hospital cultivated 2 "Overseas High-level Talents" and 1 "Reserve-level Talent. By the end of 2021, there were 4 "Local-level Leading Talents, 7 "Peacock Plan Talents (C type)", 2 "Clinical Practical Talents" and 5 "Reserve-level Talents", showing that the hospital is gradually forming a high-level talents team among which are highly educated.

3.1.3 Department setup and organizational structure

The complexity of the hospital's structure is predictable as it has to accomplish many different activities and fulfill different functions. The hospital has 68 primary departments, 60 secondary departments and 65 tertiary departments, as well as 2 quaternary departments, which can be divided into two types of functional and operational departments. In addition, the hospital has an Institute of Maternal and Child Medicine, whose responsibility is to coordinate the research work of the hospital and to continuously promote the development of the hospital's research business. Under the leadership of the hospital director and committees at all levels, the functional departments, operational departments and the Institute of Maternal and Child Medicine carry out their respective work.

3.1.3.1 Functional departments

The main responsibilities of hospital functional departments are to serve the clinical departments and manage the hospital. The functional departments of SZ Maternity and Child Healthcare Hospital mainly consist of Administrative office, Party Committee office, Discipline inspection and Supervision Office, Personnel department, Finance section, Medical department, Nursing department, Science and Education department, Price and medical insurance management department, Logistics Management department, Medical Equipment Management department, Medical Quality Control department, among others, which are responsible for reporting and transmitting information, ensuring the supply of human, financial and material resources to all departments of the hospital, and guiding and supervising medical work.

Administrative office under the direct leadership of the President for the hospital leadership to deal with the day-to-day work, it is responsible for the reporting and delivering,

liaison and coordination of internal and external offices, responsible for the secretarial work of the hospital, the preparation of hospital work plans, planning, drafting summaries and other administrative documents or information assigned by the President. Also, it takes charge of the review of administrative documents, receipt, registration, transmission, circulation, supervision, filing, storage, use and other work.

Party committee office is a comprehensive office and comprehensive coordination department under the leadership of the Party Committee of the hospital, is the hub of communication between the Party Committee and various departments, and is also the unit of the Party Committee system for external contacts and internal services. Its work responsibilities are to cooperate with the hospital party organizations to carry out various learning activities, party building and ideological education and other work, and to complete other work under the leadership of the Party Committee.

Discipline inspection and supervision office is the party supervision under the leadership of the higher discipline inspection committee and the party committee of the hospital. Under the leadership of the Party Committee of the hospital, it educates, supervises, sanctions and protects Party organizations at all levels, Party members and supervisory subjects under the jurisdiction of the hospital, and accepts the dual leadership of the Party Committee of the hospital and the higher Discipline Inspection Committee.

Personnel department is responsible for the establishment of staffing and internal organizations in accordance with the relevant policies and regulations, as well as the recruitment, selection and hiring of fresh graduates and social personnel, and the placement of military cadres and veterans in accordance with the national plan and the needs of the hospital.

Finance section is responsible for implementing the national financial policies and relevant regulations and systems, maintain financial discipline, strengthen financial supervision and financial analysis, strictly abide by financial discipline, promote the development of hospital medical, teaching and research undertakings, organize the preparation of annual budget, prepare accounting statements on time, regularly report to hospital leaders on the financial status of the hospital, timely reflect the financial information of the hospital, make the hospital financial budget public, implement and supervise the implementation of the budget, regularly carry out analysis of budget implementation, and provide reference for leadership decision-making.

Medical department is in charge of organizing and implementing medical affairs in the hospital, to formulate and regularly revise medical management-related rules and regulations according to relevant laws, regulations and rules, to organize regular training for medical staff on medical-related laws and regulations, and to implement practice in accordance with the law:

to organize regular training and assessment of medical quality and safety knowledge and skills (including "three basic" which refers to the training and assessment of fundamentals for medical quality and safety theory, knowledge and skills as well as specific such as "cardiopulmonary resuscitation skills").

Nursing department is responsible to draw up nursing work development plan, plan and group implementation and assessment according to the hospital work plan. The nursing department has clear management goals for the nursing work of the whole hospital, quarterly and monthly work priorities, annual plans and summaries, and groups to implement and enforce them.

Science and education department is responsible for organizing and implementing the teaching, development of key medical disciplines, continuing medical education for in-service medical personnel, and standardized training for resident physicians under the leadership of the dean in charge, formulating the development plan and annual implementation plan for the whole hospital's science and education work, and organizing the implementation and checking the implementation after the approval of the vice president in charge.

Logistics management department is entrusted with the logistical support and management of the entire hospital.

Price and medical insurance management department is responsible for formulating the rules and regulations of this department and the work duties of personnel, and organizing and implementing inspection, supervision, assessment and evaluation, and making annual summaries of the work of this department and the management of equipment in the whole hospital. Is also responsible for organizing the procurement, supply, management and maintenance of medical instruments and equipment and instruments throughout the hospital to ensure the smooth implementation of medical, health care, teaching and scientific research work. Review the medical equipment and medical supplies proposed by the departments to purchase applications, develop procurement plans, according to the approval authority to the relevant hospital leaders for approval and implementation.

Medical quality control department accepts the leadership of the President in charge and the medical quality management committee to monitor the whole process of medical quality of the hospital. It also helps to strengthen the management of key links, key departments and important positions of medical quality. In addition, it takes charge of establishing hospital-wide control standards for medical basic quality, link quality and end-of-life quality.

3.1.3.2 Operational departments

The largest part of the hospital is made up of clinical departments. These departments fall under four broad areas: Maternal Health, Child Health, Women's Health, and Family Planning and Technical Services.

Maternal health is responsible for maternal group health care, teaching, research and management of the specialty. There are seven departments, including maternal group health, premarital health, preconception health, pregnancy health, medical genetics and prenatal screening and diagnosis, obstetrics, and postpartum health.

The maternity group health section is responsible for providing technical support to the health and health administrative departments in formulating development plans, work specifications and technical standards for premarital health care and maternity health care in the jurisdiction. It is also responsible for the formulation, implementation and technical guidance of premarital health care and maternity health care routines in the jurisdiction, and formulating annual assessment and evaluation methods for premarital health care and maternity health care in the jurisdiction and organizing their implementation. It is entrusted by the health and health administrative departments to organize quality control, operational guidance and supervision of premarital health care and maternal health care in the jurisdiction. It carries out operational guidance and supervision of maternal death, under-five years-old child death and birth defect surveillance in the jurisdiction. It organizes maternal death and neonatal death reviews as entrusted by the health and health administrative departments. It trains relevant personnel engaged in premarital health care and maternal health care services in the jurisdiction and promotes the use of appropriate technologies. It is also responsible for the collection, quality control and statistical analysis of data related to premarital health care and maternal health care, and making recommendations for improvement. It masters the epidemiological characteristics of common maternal problems and diseases in the jurisdiction, conducting research, and providing targeted interventions.

The premarital health care specialist department is responsible for providing premarital health guidance, premarital health consultation, premarital medical examination (including medical examination for foreign-related marriages), providing medical opinions and issuing medical certificates. Also, it is responsible for establishing health files and various work registers of the couples undergoing marriage examination, regularly analyzing them, and putting forward guidance and suggestions for premarital health care work in the district.

The preconception health care specialist department is responsible for providing

preconception guidance and consultation, providing preconception medical examination and health assessment, providing preconception health care special services (psychological, nutritional, exercise, oral and breast health care, among others) and establishing work registry, regular analysis, and providing guidance and suggestions for preconception health care.

The pregnancy health care specialist department is responsible for providing routine pregnancy health care services, screening and management of high-risk pregnant women for pregnancy complications/complications, accepting referrals from the primary level, providing diagnosis and treatment of pregnancy complications and complications, providing identification, emergency care, treatment and referral of critical illnesses during pregnancy; providing prenatal screening (serological examination and ultrasound examination, etc.), providing guidance and consultation on nutrition during pregnancy, assessment of nutritional problems during pregnancy and it also provides guidance and consultation on nutrition during pregnancy, assessment and intervention of nutritional problems during pregnancy; provide guidance on oral health care during pregnancy; provide consultation and guidance on psychological problems during pregnancy; establish a work registry, regularly summarize and analyze, and put forward guidance and suggestions on health care during pregnancy.

The prenatal screening and diagnosis department is responsible for conducting prenatal screening for congenital defects and hereditary diseases, conducting prenatal diagnosis of congenital defects and hereditary diseases, establishing a referral network for prenatal screening and prenatal diagnosis to receive referrals from the grassroots, making referrals and case follow-up for suspected cases detected by screening, carrying out necessary intrauterine interventions, and registering and reporting statutory maternal and child health information. It is also responsible for the medical care, clinical specialty teaching, research and management of the specialty.

The department of obstetrics and gynecology is responsible for carrying out maternal hospital deliveries and surgeries, and the Maternal Critical Care Center provides life-saving medical treatment for critically ill mothers. Also, it is responsible for the medical treatment, clinical professional teaching, scientific research and management of the specialty. The department of obstetrics and gynecology was founded in 1979, and is a professional department that has developed and grown up together with city's Special Economic Zone. It is a national specialty of maternal health care, a member of the National Quality Control Center of Obstetrics and Gynecology, a national demonstration unit of quality services for maternal and child safety, a national training base for the treatment of critically ill mothers, and a director of the Maternal and Fetal Medicine Branch of the China Maternal and Child Health Association. It is one of the

medical centers of obstetrics in South China, with a sound obstetrics discipline system, advanced equipment, reasonable talent structure and strong technical force. The construction of obstetrics subspecialty system is in the forefront of the country. At present, there are subspecialties such as gestational diabetes ward, gestational hypertensive disease ward, fetal medicine ward, preterm delivery ward, Municipal Center for the transfer and treatment of critically ill mothers (obstetrics ICU), general obstetrics ward, placental disease ward, delivery center, LDR ward, etc. Each subspecialty has its own specialized outpatient clinic, forming an integrated management of outpatient and inpatient.

Postpartum health care specialist department is responsible for providing routine health care services for newborns, providing breastfeeding consultation and guidance to promote maternal breastfeeding services, providing health care services such as prevention and control of puerperal complications, health examination and postpartum rehabilitation, providing maternal nutrition consultation and guidance, assessment and intervention of maternal nutrition problems, providing consultation and guidance on postpartum psychological problems, providing screening, diagnosis and treatment and referral of postpartum psychological problems, providing contraception. It also provides guidance on birth control measures to avoid unwanted pregnancies, provide technical guidance on postpartum visits to primary medical and health institutions, establish various work registries, regularly summarize and analyze, and provide guidance and recommendations on postpartum health care.

The department of children's health care is responsible for children's group health care and the teaching, research and management of this specialty. It consists of 13 units (also called departments), including the Department of Children's Group Health Care, the Department of Newborn Disease Screening, the Department of Children's Growth and Development, the Department of Management of Children at Risk, the Department of Children's Nutrition, the Department of Children's Mental Health, the Department of Children's Eye Health, the Department of Children's Oral Health, the Department of Children's Ear, Nose and Throat Health, the Department of Children's Rehabilitation, the Department of Pediatrics, the Department of Neonatology, and the Department of Traditional Chinese Medicine.

The child group health section is responsible for providing technical support to the health and health administrative departments in formulating development plans, work norms and technical standards for child health care work in the jurisdiction; responsible for the formulation, implementation and technical guidance of child health care work routines in the jurisdiction; formulating annual assessment and evaluation methods for child health care work in the jurisdiction and organizing implementation. It is commissioned by the health and health

administrative departments to organize child health care services carried out by various institutions at all levels in the jurisdiction. Also, entrusted to provide operational guidance, supervision and quality control for the monitoring of child deaths under 5 years of age in the jurisdiction, and to organize the review of child deaths under 5 years of age as entrusted by the health and health administration; to be responsible for the operational management and guidance of health care in child care institutions in the jurisdiction, to provide training for personnel engaged in child health care services in the jurisdiction, to promote appropriate technology, to be responsible for the collection, quality control and statistical analysis of data related to child health care, and to keep abreast of common child health problems in the jurisdiction. Statistical analysis, mastering the epidemiological characteristics of common diseases and health problems of children in the jurisdiction, conducting research and providing targeted interventions.

The newborn disease screening section is responsible for establishing a newborn disease screening network in the District, conducting regular quality control and technical guidance and supervision of testing laboratories, collecting, analyzing, reporting and providing feedback, providing guidance and consultation on newborn disease screening, collecting and transferring newborn disease screening samples in the District, conducting laboratory tests for diagnosis (institutions with newborn screening center qualifications), and providing clinical confirmation and treatment for positive screening, the clinical diagnosis and treatment of children with positive screening, the establishment of files and follow-up of children with positive screening; research on new screening methods and diseases, and the expansion of screening diseases according to local conditions.

The division of child growth and development is responsible for providing consultation and guidance on child physical growth and development, conducting physical measurements and evaluation, and motor function measurements and evaluation; conducting screening of children with physical growth and developmental deviations, accepting referrals of children with physical growth and developmental deviations from the primary level, and providing health promotion services for children; using biochemical, chromosomal, genetic and other laboratory tests to diagnose the cause of physical growth and developmental deviations in children. Provide nutrition prescription exercise prescription intervention for children with deviated physical growth, provide endocrine treatment for children with deviated physical growth; establish health records for children with deviated physical growth and follow up, conduct physical fitness tests for children as appropriate, and establish physical health records for children; establish a work register, summarize and analyze, and put forward opinions and

recommendations for children's growth and development.

The high-risk child management section is responsible for conducting screening of high-risk children, carrying out regular monitoring and intervention for high-risk children, and establishing a referral mechanism for high-risk children.

The department of child nutrition is responsible for child nutrition health education, child feeding guidance, breastfeeding counseling and guidance, breastfeeding under special circumstances, breastfeeding assessment intervention, and complementary food addition counseling and guidance.

The department of children's mental health is responsible for providing children's psychological counseling and guidance, providing health care services for the promotion of children's psychological and behavioral development, conducting screening for abnormalities in children's psychological and behavioral development, accepting referrals of children with abnormal psychological and behavioral development from the grassroots level, providing referrals for the identification of children's psychological disorders, establishing a work register, regularly summarizing and analyzing, and making suggestions and recommendations for children's mental health work.

The department of children's eye care is responsible for providing guidance and consultation on eye care, providing guidance on external eye examination and eye care, diagnosis and treatment of eye infectious diseases, screening, diagnosis and treatment of eye diseases, visual function assessment, vision screening for preschool children, providing review and follow-up for children with abnormal vision screening, medical optometry and correction of refractive errors, diagnosis of refractive error and amblyopia in children and correction of visual function, establishment of various work registries, regular summaries and analyses, and making opinions and recommendations on children's eye care.

The department of children's oral health care is responsible for providing oral health care guidance and consultation (correction of oral malpractice), providing children's oral health examination, carrying out prevention of children's teeth caries, providing diagnosis and treatment of common children's oral problems and diseases, establishing a work register, regularly summarizing and analyzing, and putting forward opinions and suggestions on children's oral health care work.

The department of children's ear, nose and throat health care is responsible for providing guidance and consultation on children's hearing health care, conducting regular hearing screening for children, following up on those with abnormal initial screening and those with high-risk factors for hearing loss, conducting audiological diagnosis for infants and

children with hearing abnormalities according to institutional qualifications, providing hearing aid fitting services for children, conducting speech rehabilitation for infants and children with hearing abnormalities (home rehabilitation and outpatient rehabilitation), conducting diagnosis and treatment of common diseases of the ear, nose and throat in children, establishing a work register for regular summary and analysis, and putting forward opinions and recommendations on children's ear and throat health care.

The department of pediatric rehabilitation is responsible for providing rehabilitation guidance and basic intervention training for children with mental and behavioral developmental abnormalities, carrying out pediatric rehabilitation treatment and training, and undertaking scientific research, teaching and medical consultation and treatment in this discipline.

The department of pediatrics is responsible for outpatient and inpatient services for children (including PICU - Pediatrics intensive care unit), as well as research, teaching and medical treatment in the department. The department of pediatrics became a key provincial clinical specialty in July 2013, an auxiliary unit of the national pediatric residency standardized training base at the end of 2014, and introduced the pediatric three-projects (Professor Luo Xiaoping's team from the Department of Pediatrics, Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology) in 2018, a clinical department of the National Rare Disease Diagnosis and Treatment Collaborative Network Hospital, and a member of the Multi-disease Specialized Diagnosis and Treatment Alliance.

The department of neonatology is responsible for the inpatient treatment of newborns (including Neonatal ICU) and undertakes scientific research, teaching and medical treatment in this department. The department of neonatology was awarded as a national clinical key specialty in 2011, built as the vice chairman unit of the national neonatal medical association and the national training base for perinatal neonatologists in 2018, and recognized as a high-level clinical key provincial specialty in 2019, as well as a critical neonatal provincial treatment center, a provincial training base for neonatal specialist nurses, a key municipal clinical discipline and a unit of the main committee of municipal neonatal medical quality control center.

The department of TCM pediatrics is responsible for carrying out outpatient work of Traditional Chinese Medicine Pediatrics, providing TCM treatment services, and undertaking scientific research, teaching and medical treatment of this discipline.

The department of women's health care is responsible for women's group health care, teaching, research and management of the specialty. There are six sections including Women's Health, Adolescent Health, Menopause Health, Breast Health, Gynecology (including Cervical Cancer Early Diagnosis and Treatment Center) and Chinese Medicine Gynecology.

The women's group health section is responsible for providing technical support to the health and health administration in formulating development plans, work specifications and technical standards for women's health care work in the jurisdiction; responsible for the formulation, implementation and technical guidance of women's health care routines in the jurisdiction; responsible for formulating annual assessment and evaluation methods for women's health care work in the jurisdiction and organizing their implementation. It is also entrusted by the Health Administration to carry out operational guidance, supervision and quality control of screening and general treatment of common diseases among women in the jurisdiction, technical services for family planning, and labor protection of female workers, to train relevant personnel engaged in women's health care medical services in the jurisdiction, to promote appropriate technologies, to be responsible for the collection, quality control and statistical analysis of data related to women's health care, and to make recommendations for improvement, to master common problems among women in the jurisdiction and epidemiological characteristics of diseases, conduct research, and provide targeted interventions.

The adolescent health division is responsible for providing assessment and guidance on adolescent physical development, counseling and guidance on common problems of adolescent physical development, counseling and guidance on adolescent nutrition, assessment and intervention on adolescent nutritional problems, counseling and guidance on adolescent mental health, counseling and guidance on adolescent sexuality, family planning and reproductive health, prevention and treatment of common adolescent reproductive health diseases, prevention and guidance on adolescent unwanted pregnancy and termination of unwanted pregnancy, establishment of various work registries, regular summaries and analyses, and suggestions and recommendations on adolescent health care work.

The department of menopause health care is responsible for providing routine physical examination and management, prevention and treatment of reproductive tract infections and sexually transmitted diseases, health care guidance for perimenopause and old age, diagnosis and treatment of perimenopause related diseases, prevention and rehabilitation of old age related diseases, counseling and guidance on common psychological problems during menopause, counseling and guidance on nutrition during menopause, establishment of various work registries, regular summaries and analyses, and suggestions and recommendations on health care work for the elderly.

Breast health department is responsible for the prevention and treatment of breast disease, breast diagnosis and screening of specialist exploration, providing consultation and guidance

on common breast problems, establishing various work registries, regularly summarizing and analyzing, and putting forward opinions and recommendations on breast health work.

The department of gynecology (including the Center for Early Diagnosis and Treatment of Cervical Cancer) is responsible for the outpatient and inpatient treatment of gynecological patients; it is also responsible for teaching, scientific research and treatment in this specialty. The department of gynecology is one of the key disciplines in hospital, with a team of talents with rich clinical experience, strong technical force and strong teaching and research ability. The gynecology clinic has set up several specialties, such as menopause specialty, adolescent gynecology, cervical specialty, etc. It has been several national training centers or demonstration bases, such as: demonstration base for early diagnosis and treatment of cervical cancer, training base for gynecologic endocrinology and common gynecologic diseases, PAC training base, etc.

The department of TCM gynecology is responsible for the treatment of TCM gynecology patients and for teaching, scientific research and treatment in this specialty.

The department of family planning technical service is responsible for family planning-related clinical treatment, teaching, scientific research and management, and consists of five departments, including Family Planning Technical Service Guidance Section, Family Planning Consultation Guidance Section, Family Planning Surgery Section, Male Reproductive Health Section, and Contraceptive Management Section.

The family planning technical service guidance section is responsible for teaching, research and management related to family planning surgery.

The family planning counseling and guidance section provides family planning counseling and guidance, post-operative care services, health education and guided follow-up visits.

The family planning surgery section provides family planning surgery appropriate to the conditions of the institution, conducts medical examinations for the provision of contraceptives and birth control surgery, conducts diagnosis and treatment of adverse reactions to family planning drugs, establishes a registry of various surgeries, summarizes and analyzes them regularly, and makes comments and recommendations.

The male reproductive health department is responsible for carrying out pre-conception sperm quality assessment for men, carrying out male infertility consultation and treatment, receiving referral services, carrying out prostate disease consultation and treatment, receiving referral services carrying out male reproductive tract infection consultation and treatment, receiving referral services; carrying out consultation and treatment of other male diseases;

establishing a registry and regular summary and analysis.

The contraceptive management section is responsible for carrying out the management of contraceptives, finding adverse reactions and adverse events to contraceptives, reporting them in a timely manner, establishing a register, and summarizing and analyzing them on a regular basis.

Overall, the departments compose a complex and intricate network of specialized services and because sometimes the same naming is used for nested departments, Figure 3.1 shows the simplified organizational chart of the hospital for clarity's sake.

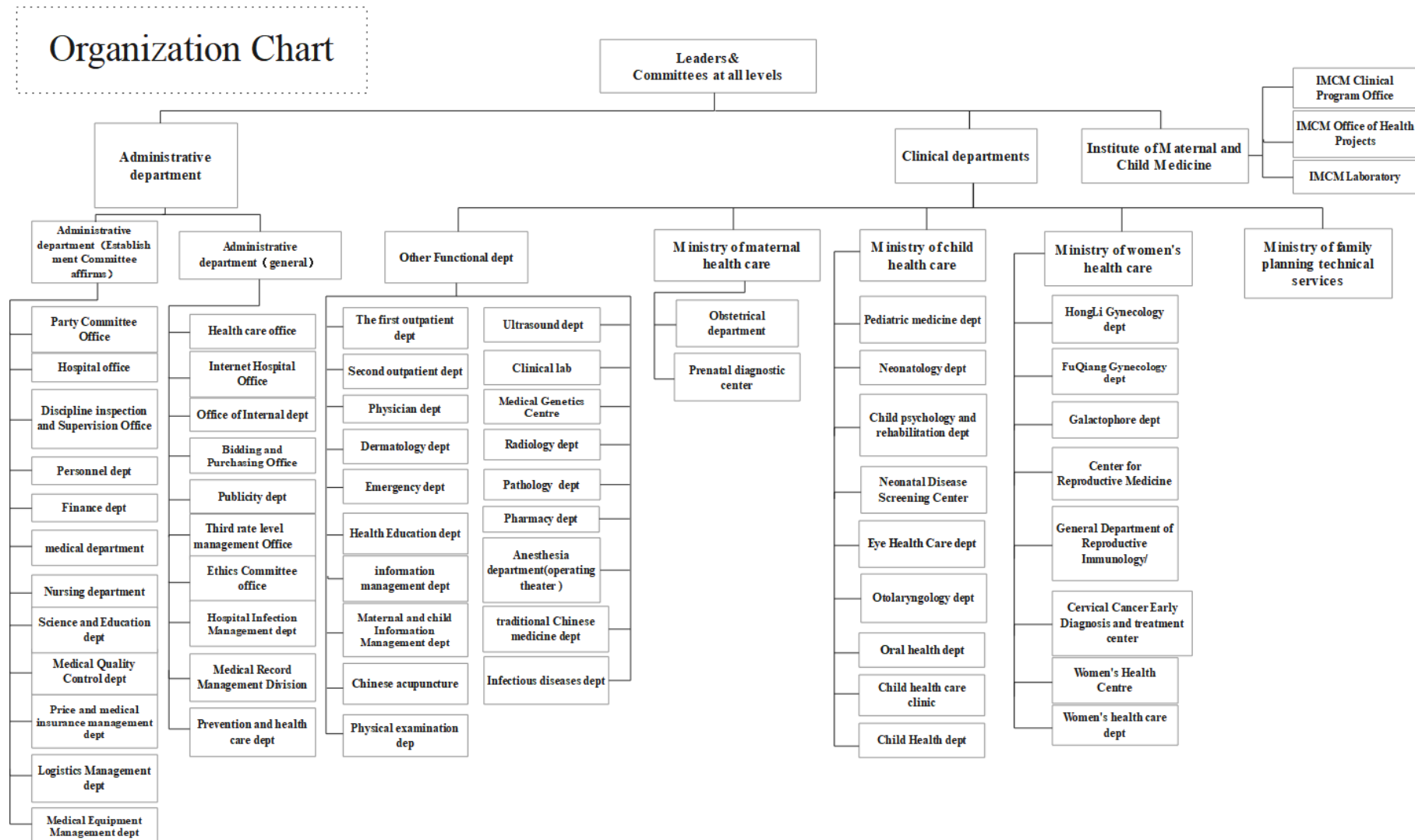


Figure 3.1 SZ Maternity and Child Healthcare Hospital Organizational Chart

3.2 Method

3.2.1 Developing the interview script

Two interview scripts were designed according to the position of the interviewees. One for top managers and another one for the cadres.

For top managers, the interview was intended to grasp the larger picture as regards business indicators and manpower allocation. The business indicators were targeted by means of two sets of questions intended to understand the core indicators measuring the business development and their relationship with the authorized headcount as well as the expected trend in the near future:

1. What do you think are the core business indicators that measure the business development of our hospital? What are the relationships between the indicators and the overall hospital manpower establishment?

2. With the growth of core business indicators, what do you think is the changing trend of the staff number in each business and functional department in the next three years? Why is the trend?)

Once in possession of this information, the interview script focuses on manpower allocation via three sets of questions.

3. Do you think that the existing manpower allocation of each department can match the development strategy of the hospital? Can it play a supporting role for business? If not, which departments or functional responsibilities need more manpower strengthened and supplemented?

4. Do you think the current post settings of each business and functional section are reasonable? Is there any buck-passing between departments and positions? Is the manpower being fully utilized? What is the direction of optimization and adjustment?

5. Do you have any expectations and suggestions for the "three-determinations" project of the hospital? (Including the main guiding ideology and direction of staffing, the business units that need to be focused on (should be increased or decreased), the key aspects that need to be focused on in the work process of the project team, etc.)

These questions were designed to collect the interviewees' evaluation on the sufficiency of manpower to attain the organizational objectives, to identify mismatches or inefficiencies

related to the full use of manpower, and expectations about optimizing the three determinations (responsibility – position – headcount).

For cadres or directors of both clinical and functional departments, the interview was intended to understand a closer view on the department staffing, job optimization and expectations regarding manpower allocation.

The first set of questions was designed to understand the responsibilities of the department, staff structure and what limitations current staffing may create (insufficiency, redundancy, overlap with other departments) as well as the criteria used for staffing. Lastly, an overall evaluation of staff adequacy was probed.

1. Please briefly introduce the main responsibilities of your department, the current status of your staff, the staff structure, and the job division among them.

2. Are the responsibilities of the department clear in its daily operation? Does it effectively support and serve your department? Are there any crossover or overlap of responsibilities with other departments?

3. What is your opinion about the current job saturation level of the department? What are the key influencing factors you suppose can affect the number of department personnel? (Does the responsibilities of the department changed? The number of staff in the first three years, how the number changed every year, the reason for the change?) For what responsibility do you think the headcount should be increased?

4. Is there any relevant guidance document on the number of staffing in the department by the supervisory authority or the parent unit? What is the measured staffing level based on the document? If the headcount is increased according to the guidance document, what is the increased output of the department?

5. Are there differences in current staffing compared to hospitals of the same type and size? What are the reasons for the differences?

The second set of questions was designed to understand the room for job optimization, namely by focusing on the interviewee's departmental staffing situation, how efficient the allocation of positions is being done, how much each position reflects specific responsibilities, and how this all can be optimized.

6. Please describe your department's posting situation.

7. What is the principle of consideration for the current departmental posting? Is there any crossover of responsibilities between positions? How efficient is the collaboration between posts? What is the matching degree between the job name and the core duties of the job?

8. How do you think the position can be adjusted and optimized in the future?

Lastly, a single question was placed to elicit the expectations of the interviewee on staffing management and contribute of the study for that purpose (Do you have any other expectations or suggestions about this project?)

3.2.2 Eligibility criteria

The most critical decision makers in the hospital and, also relevant for staffing management decisions, were eligible for interview. Namely, at the top management level the most important were the President, the secretary of the Party Committee, all the four vice-presidents with responsibilities in and the chief accountant.

At the departmental direction level all the managers of functional departments were eligible and so we targeted a total of six directors: the director of the personnel department, the director of the finance department, the director of the medical department, the director of the nursing department, the director of the logistics management department, and the director of the security section. From the clinical departments, we targeted six important decision makers: the director and the head nurse of pediatrics, the deputy director and head nurse of obstetrics, the director and head nurse of gynecology, and the director and head nurse of the emergency department. Due to the work reasons and the actual position of the researcher, combined with the research purpose, different experts may have different perspectives in the same department. For example, the director or head nurse of the same clinical department may have different familiarity with the situation of the staff in the department in the actual interview, so 83 experts were interviewed in the actual interview, and the first-hand information was successfully obtained. Table 3.1 shows the information of the interviewees.

Table 3.1 Description interviewed experts

No.	Gender	Age	Years of working	Professional title	Department
L1	Male	60	18	President	-
L2	Male	57	6	Party Secretary	-
L3	Male	59	26	VP for	-
L4	Male	55	32	VP for	-
L5	Female	52	6	VP for	-
L6	Male	57	31	VP for	-
L7	Male	51	3	Chief accountant	-
L8	Female	40	16	Director	Party Committee
L9	Male	38	13	Director	Administrative
L10	Female	53	27	Director	Discipline inspection and Supervision
L11	Female	39	16	Director	Personal
L12	Female	42	13	Director	Finance
L13	Female	46	19	Director	Medical
L14	Female	54	31	Director	Nursing

No.	Gender	Age	Years of working	Professional title	Department
L15	Female	51	26	Director	Science and Education
L16	Female	42	9	Director	Price and medical insurance management
L17	Female	44	12	Director	Medical Equipment Management
L18	Male	40	17	Deputy Director	Logistics Management
L19	Male	33	10	Deputy Director	Logistics Management
L20	Male	44	23	Deputy Director	Logistics Management
L21	Female	57	18	Director	Medical Quality Control
L22	Female	38	13	Director	Administrative
L23	Male	57	30	Director	Internet Hospital
L24	Male	58	27	Director	Prevention and health care
L25	Female	44	10	Director	Medical Record Management Division
L26	Female	50	31	Director	Hospital Infection Management
L27	Female	38	18	Director	Discipline inspection and Supervision
L28	Female	43	12	Director	Bidding and Purchasing
L29	Male	58	18	Director	Health care
L30	Male	59	30	Director	Institute of Maternal and Child Medicine
L31	Female	53	15	Director	Institute of Maternal and Child Medicine
L32	Male	51	0	Director	Institute of Maternal and Child Medicine Laboratory
L33	Male	58	32	Director	Pediatric
L34	Female	57	25	Head Nurse	Pediatric
L35	Male	53	5	Director	Pediatric
L36	Female	53	30	Director	Child health care clinic
L37	Female	52	34	Head Nurse	Child health care clinic
L38	Male	60	20	Director	Child psychology and rehabilitation
L39	Male	56	30	Director	Neonatology
L40	Female	47	28	Head Nurse	Neonatology
L41	Female	58	28	Director	Neonatal Disease Screening Center
L42	Female	59	36	Deputy Director	Obstetrical
L43	Female	58	35	Deputy Director	Obstetrical
L44	Female	49	28	Head Nurse	Obstetrical
L45	Male	54	28	Director	HongLi Gynecology

No.	Gender	Age	Years of working	Professional title	Department
L46	Female	58	35	Head Nurse	HongLi Gynecology
L47	Female	53	10	Director	FuQiang Gynecology
L48	Female	38	18	Head Nurse	FuQiang Gynecology
L49	Female	58	27	Director	Women's Health Centre
L50	Female	48	26	Head Nurse	Women's Health Centre
L51	Female	48	28	Head Nurse	Galactophore
L52	Female	45	6	Director	TCM
L53	Female	51	29	Head Nurse	TCM
L54	Female	50	27	Director	Center for Reproductive Medicine
L55	Female	51	28	Head Nurse	Center for Reproductive Medicine
L56	Female	60	15	Director	General Department of Reproductive Immunology
L57	Female	43	14	Head Nurse	General Department of Reproductive Immunology
L58	Female	57	28	Director	Emergency
L59	Female	50	28	Head Nurse	Emergency
L60	Male	44	20	Director	Anesthesia (operating theater)
L61	Female	58	37	Head Nurse	Anesthesia(operating theater)
L62	Female	51	12	Director	Physician
L63	Female	42	13	Director	Dermatology
L64	Male	42	16	Director	Physical examination
L65	Female	38	16	Head Nurse	Physical examination
L66	Female	58	16	Director	Eye Health Care
L67	Female	53	22	Head Nurse	Oral health dept
L68	Male	55	34	Director	Clinical lab
L69	Female	43	17	Director	Medical Genetics
L70	Male	52	2	Director	Pathology
L71	Male	41	17	Director	Radiology
L72	Male	58	35	Director	Ultrasound
L73	Male	40	8	Director	Chinese acupuncture
L74	Female	46	28	Director	The first outpatient
L75	Female	51	26	Head Nurse	The first outpatient
L76	Male	50	26	Director	Second outpatient
L77	Female	55	34	Head Nurse	Second outpatient
L78	Female	42	14	Director	Pharmacy
L79	Male	47	3	Director	Information management
L80	Female	55	28	Director	Maternal and child Information Management
L81	Female	57	19	Director	Health Education
L82	Female	52	26	Director	Women's health care
L83	Male	45	16	Director	Child health care

3.2.3 Procedure

The researcher began to prepare the interview plan by July 2021, including the mobilization of workers in the hospital, the formulation of the interview plan and the determination of the interview content.

The expert interviews were carried out according to the schedule of the available time of hospital specialists, and planned to complete interviews with seven hospital leaders and 76 specialists within two weeks. This occurred between August 23, 2021 to September 1, 2021 where interviews were conducted while sending out notices through the online office system and reconfirming the interview schedule with the interviewees prior to the meeting day.

To conduct the interviews, the researcher teamed up with supportive staff so to guarantee that each team comprises two people with complementary roles: one in charged with asking and explaining relevant questions, and the other in a supportive role, in charge of taking notes.

The interviews were conducted in a fixed meeting room, and the interviewers conducted face-to-face communication interviews with each hospital leader and middle-level cadres in turn. The interviews with each hospital leader lasted in average 60 minutes and other middle-level cadres were interviewed for about 30 minutes. The interviews followed the interview script while allowing to adjust to emerging information by adding supplementary questions or clarifications, and thus followed a semi-directive structure, which is suitable for the purposes of the research (Fylan, 2005).

3.2.4 Data collection and analysis

The interview was conducted following the protocol established by the reviewer. An independent interviewer was deployed because the current research is embedded in a larger project for optimization of the hospital but especially because there might be interference between the responsibilities assumed by the researcher and the opinion interviewees would feel comfortable sharing. As plausible conflict of interest may arise, an independent interviewer is a suitable solution.

The interviewer is a trained experienced professional, and the interview counted on three people: the interviewer, and one assistant taking notes, and another one to compile and summarize the entire interview. After the interview, the notes were structured in a table for coding.

The coding was conducted manually, departing from a set of categories as found in the literature review but also allowing for the emergence of new categories extracted from the

content. The *a priori* categories were kept in a minimum so to allow for the maximum fit to the reported reality. Since the qualitative study has an exploratory nature, we opted to keep all possible categories open to favor a closer-to-reality interpretation process.

The categories found in literature and used in the coding are the following:

Balance: It expresses the fit between the staff needs and existing staff.

Overstaffed: It expresses the surplus of staff that is allocated to a specific unit.

Understaffed: It expresses the lack of staff within a specific unit.

Unbalanced mixed: It expresses a complex situation where one can find a good match of needs and existing staff, but the staff does not gather the required profile (e.g. lack of familiarity, lack of qualification)

Productivity: It expresses the work efficiency, i.e. the workload and number of pending tasks one can get done

Absenteeism: It expresses the number of hours not worked and not attributable to a purposeful planned situation

Motivation: It expresses the willingness to put effort in work tasks

Overtime: It expresses the extra hours worked as a manifestation of workload

Quantitative match: It expresses the fit between the number of staff required and the number of staff allocated

Qualitative match: It expresses the fit between the profile of qualification of staff required and the profile of qualification of staff allocated

Centralization: It expresses the degree in which decisions are made by a small number of people as compared to the existing staff.

Data management: It expresses the design of data collection and processing and the use of IT to make it efficient, reliable and secure.

Sourcing: It expresses the use of external workforce, purposively hired to complement internal workforce.

Staff role clarity: It expresses the lack of ambiguity in allocating responsibilities to staff and across departments and units.

Recruitment and selection: It expresses the efforts, processes and resources conducive to attracting, selecting and allocating qualified staff

Career promotion: It expresses the design of sequenced job positions that are increasingly challenging and based on selection criteria

Performance appraisal: It expresses the process of evaluating performance (both job and unit) by which indicators are extracted and decisions made to increase performance and correct performance gaps.

Table 3.2 shows the coding categories and contents.

Table 3.2 Coding categories and contents

Topic	Category	Frequency	Example
Evaluate current situation as regards the headcount	Balance: the situation is good	9	Current personnel is basically sufficient. (L12) The personnel is sufficient. (L41, L71, L68, L77) Personnel workload is saturated. (L19) The current number of staff can relatively meet the requirements. (L35) The current staffing can basically meet the business requirement. (L78) Current personnel can meet the business requirement. (L61)
	Unbalanced – Overstaffed	2	The staffing number is relevantly sufficient in Hongli district. (L43) The current workload is uneven between departments, and the work is coordinated to keep the staff workload relatively even (L18)
	Unbalanced – Understaffed	23	“The current number of staff in the department is not able to meet the work demand of the department. There will be two sites of one hospital in the future, and we will require one more staff” (L11, Dir. Nursing dept.) There are still not enough people, and there is a shortage of people with medical background to work in the medical management system. (L16) The current staff number in the department is not enough to meet the work demand of the department. (L17) Some additional personnel are needed after the new district is opened. (L23, L29, L80, L44, L74) High workload requires additional staff. (L24, L30, L52, L47) Insufficient manpower for some businesses. (L81) Need to increase some professional staff. (L83) Already reserve staff for new hospital area, but not enough. (L43) Physician work is intense that can barely fulfill the current situation if without additional beds. Personnel are often out of position (maternity and sick leave, temporarily serving in the countryside, training, transfer, etc.). The staff newly enrolled is not enough to cover those in temporarily leave. (L35) More research staff is needed in some departments. (L46, L39, L33, L82) Need a few more general nurses who can be the supplement during busy business times. (L64) Departments have a lot of things to do and are currently stretched. (L58) Staffing is relatively tight. No new staff enrolled in the past 10 years. The revenue generation has doubled, and staffing load has reached its limit (L59)
	Unbalanced – Mixed indication (some dept under	7	Staffing is basically sufficient to meet the situation, but what is lacking is personnel who are more familiar with the hospital. (L8)

Evaluate impact of the staffing current situation	and some overstaffed)		The number of people is still enough, there are certain requirements on the ability of the department staff. (L18) The current number of staff can meet the demand, but the staff quality cannot meet the requirements. (L20) The staff number is basically sufficient, but the talent structure is bad. (L42) The current workload of nurses is relatively saturated. After the opening of the new hospital district: additional outsourced clerks and assistant nurses will be needed almost 10 more. (L67)
	Productivity	5	There is still room for improvement in work efficiency. (L35) Need to optimize the staff size to improve work efficiency. (L49) Too much paper work, staff cannot focus on clinical job. (L43) 30% increase in workload with reduction of staff from 24 to 20, which shows the improvement of human efficiency. (L66) Too much extra-clinical work such as training and public health programs, which affects clinic performance. (L60)
	Absenteeism	0	No assertions were made concerning this topic.
	Motivation	4	Staff is sufficient, but only few are willing to work. (L44, L22) Being able to give better treatment to motivate young people. (L38) Motivating young doctors by positioning and staffing. (L34) Technicians are not highly motivated ... (especially the experienced staff. Management is difficult). (L49)
	Overtime	2	The department has been working overtime at night from 2005 to now (L46) One doctor serves 5 patients and often works overtime (L41)
	Quantitative match (the right number of employees)	33	Adequate proportioning. (L33) Current personnel are basically sufficient. (L12) The personnel are sufficient. (L41, L71, L68, L77) Personnel workload is saturated. (L19) The current number of staff can relatively meet the requirements. (L35) The current staffing can basically meet the business requirement. (L78) Current personnel can meet the business requirement. (L61) “The current number of staff in the department is not able to meet the work demand of the department. There will be two sites of one hospital in the future, and we will require one more staff” (L11, Dir. Nursing dept.) There are still not enough people, and there is a shortage of people with medical background to work in the medical management system. (L16)
Evaluate the staffing management practices			

Qualitative match (the right profile of employees)	11	The current staff number in the department is not enough to meet the work demand of the department. (L17)
		Some additional personnel are needed after the new district is opened. (L23, L29, L80, L44, L74)
		High workload requires additional staff. (L24, L30, L52, L47)
		Insufficient manpower for some businesses. (L81)
		Need to increase some professional staff. (L83)
		Already reserve staff for new hospital area, but not enough. (L43)
		Physician work is intense that can barely fulfill the current situation if without additional beds.
		Personnel are often out of position (maternity and sick leave, temporarily serving in the countryside, training, transfer, etc.). The staff newly enrolled is not enough to cover those in temporarily leave. (L35)
		More research staff is needed in some departments. (L46, L39, L33, L82)
		Need a few more general nurses who can be the supplement during busy business times. (L64)
		Departments have a lot of things to do and are currently stretched. (L58)
Centralization vs decentralization decisions staffing	2	Staffing is relatively tight. No new staff enrolled in the past 10 years. The revenue generation has doubled, and staffing load has reached its limit (L59)
		The current number of staff can meet the demand, but the staff quality cannot meet the requirements. (L20)
		There are 3 people with unsuitable business skills (L33)
		No need for too many dedicated nurses. More assistants are needed, and the labor costs will be reduced. Currently, "operational talents" are needed. (L35)
		Nurses need to be all-rounders and be familiar with every position. (L68)
		The cost of hiring nurses is relatively high, some pre-screening and triage can be done without nurses. (L64)
		Need all-rounders. (L57)
		what is lacking is personnel who are more familiar with the hospital. (L8)
		There are certain requirements on the ability of the department staff. (L18)
		The current number of staff can meet the demand, but the staff quality cannot meet the requirements. (L20)
		The staff number is basically sufficient, but the talent structure is bad. (L42)
		The current workload of nurses is relatively saturated. After the opening of the new hospital district: additional outsourced clerks and assistant nurses will be needed almost 10 more. (L67)
		Need to give the leaders an ideal state. The leaders will make the decision and adjust according to the hospital situation. (L10).
		Arbitrary demand for manpower of each department needs to be eliminated. (I3)

Evaluate the competency-based practices	Data management	3	The degree of informatization affects the financial staffing. Need to accelerate the construction of information systems. (L15) The level of informatization is relatively poor. (L78) Informatization is seriously lagging behind. For example, staff cannot see the medical report on WeChat. (L53) The information management department should [...] but also have richer and fuller responsibilities (e.g. information construction, electronic medical records management, information platform construction, “Internet plus”, data governance, data center building). (I5)
	Sourcing (internal only, mixed, external only)	2	To account for the staffing of third-party personnel into the total staffing. Need to consider the reasonableness of the number of third-party staffing (I9) Third party staff are more mobile and can affect the management of the department. (L79, L62)
	Staff role clarity / overlap	38	Clear responsibilities. (L21, L31, L43, L38, L37, L39, L70, L71, L35, L67, L46, L64, L51, L58, L76) “There are still some overlaps and unclear contents.” (I10, Dir Medical Dept) “Nursing work is relatively independent, and the responsibilities with other departments are relatively clear.” (I11, Dir Nursing dept). Department positioning, planning, and structure need to be sorted out clearly. (L8) There are some intersection boundaries that are not clear between the jobs. When many people on the same level are doing one job, more push-back will generate. (L11) Unclear responsibilities in the management of fixed assets. (L15) There is some crossover and unclear contents between department. (L16, L18, L22, L26, L14, L28, L32, L48, L19, L49, L62, L50, L55) Departmental responsibilities need to be more clearly defined (L20) Internal responsibilities are clear, interdepartmental responsibilities are unclear (L23) Confusion and intersection of current duties with other duties (some of the middle-level cadres assume the responsibilities of two departments. L9) Unclear positions and responsibilities (L41) Hearing screening program has duty crossover. (L78)
	Recruitment & Selection	1	No personnel authority (L39)
	Career promotion	6	Need to have a promotion path planned for nurses. (L78) Learn from foreign management models that do not look at titles, experience, and focus more on competencies. Manage administrative staff, technicians, and researchers separately. (L38) Establish a mechanism to get rid of some positions and people who do not work. (L35)

Performance appraisal	12	Referring to the pyramid structure of the HKU hospital (consultant - associate consultant - senior doctor - junior doctor). it is suggested that an internal promotion mechanism can be formed in the future that staff can compete for jobs through ability. (L34) At present, there is a big problem that we only enroll the new staff without an elimination mechanism. There needs to be a mechanism for entry and elimination, promotion and demotion. (L50, L51) Need to assess the department performance based on risk factors. (L67) New departments should not simply look at performance and how much money they make. Public hospitals need to have social benefits and impact. (L42) Third party staff are more mobile and can affect the management of the department. (L79, L62) The outpatient doctors will be assigned to the wards for unified management, so the bonus cannot be allocated according to the current standard that outpatient clinic and ward distribute the bonus separately. (L37) The department bears the social benefits, so the treatment cannot be the same as that of other departments. (L44, L74) For third-party support staff, the property company can set up a mobile group, which also needs to assume the responsibilities of transportation. The motivation of the caregivers can be mobilized by the form of online orders grabbing. (L71) Need job rotation between outpatient area and ward. (L40, L66) Due to the historical reasons, doctors in outpatient clinics are always there, so the connection with wards is needed. Ward staff are not satisfied with performance, because the workload is high while the bonuses are sometimes not as good as outpatient staff. (L39, L58)
-----------------------	----	--

3.3 Results

For clarity's sake this section will show findings based on the leading questions use to structure the interview rationale. For clarity's sake this section will show findings based on the leading questions use to structure the interview rationale. We will start by answering "What is the current situation as regards the headcount?". This offers a verification on the overly repeated warning in literature about current lack of staff in healthcare worldwide. The second question pertains to the impacts such (eventual) staffing issues have. It offers a sense on the scope and importance of staffing issues. The third question is directed to how staffing management practices are evaluated. Are these judged as being suitable or unsuitable? And in which dimensions can suitability be judged? Lastly, the fourth question pertains to the evaluation of practices as regards competency-based management. Is competency-based management a reality? How is this treated in regards to HR practices such as recruitment and selection, performance appraisal, compensation, career decisions.

3.3.1 Interview question #1 What is the current situation as regards the headcount?

The interviewees mostly reported their department was globally understaffed (n=23) although the second largest category indicated the staffing was adequate for the needs of the department (n=9). A congruent finding relates with reports of mixed situation where either the quantitative staffing matched the requirements but the interviewees felt the qualification was falling behind their needs (n=7) or that there are cases of both overstaffing and understaffing depending in the specific departments. Overall, the predominant opinion is that the organization is lacking personnel. The results of the interviews on this section are shown in Table 3.3.

"There are still not enough people, and there is a shortage of people with medical background to work in the medical management system". (L16)

"The current staffing can basically meet the business requirement". (L78)

"Staffing is basically sufficient to meet the situation, but what is lacking is personnel who are more familiar with the hospital". (L8)

Table 3.3 Table of categories and frequencies

Dimension	Category	Example	frequency
Staffing	Balanced	The personnel are sufficient (L41, L71, L68, L77)	9
	Overstaffed	The current workload is uneven between departments (L18)	2
	Understaffed	current number of staff in the department is not able to meet the work demand (I11)	23
	Mixed situation	number of staff can meet the demand, but the staff quality cannot meet (L20)	7
Total			41

3.3.2 Interview question #2 What are the impacts of the staffing current situation?

Regarding the impact of the current state of staffing, the general perception is that efficiency is not high. Table 3.4 shows the specific content and frequency of responses.

The consequences that were attributed to the current staffing situation suggested there is occasionally hampers productivity (n=5) equivalent to some motivational problems (n=5) and less translated into overtime (n=2). Although the frequency with which this issue emerged is relatively small, negative acknowledgement of such impacts are usually expressed tacitly and the explicit content may not reflect its true magnitude. Interestingly, one of the categories was never mentioned by the interviewees (i.e., absenteeism) which is in line with the hospital staff records thus showing absenteeism is not occurring. The results of the interviews on this section are shown in Table 3.4.

“Need to optimize the staff size to improve work efficiency”. (L49)

“Staff is sufficient, but only few are willing to work”. (L44, L22)

“The department has been working overtime at night from 2005 to now” (L46)

Table 3.4 Table of categories and frequencies

Dimension	Category	Example	frequency
Consequences	Productivity	Need to optimize the staff size to improve work efficiency. (L49)	5
	Absenteeism	---	0
	Motivation	Staff is sufficient, but only few are willing to work”. (L44, L22)	5
	Overtime	One doctor serves 5 patients and often works overtime (L41)	2
Total			12

3.3.3 Interview question #3 How do you evaluate the staffing management practices?

Regarding employees' evaluation of staffing management practices, the focus of attention was inconsistent, with some believing that the number of staff in the department was inadequate,

some believing that the staffing structure was set up unreasonably, and some believing that there was crossover in the responsibilities of each section resulting in unclear responsibilities, Table 3.5 shows the statistics of the number of responses in each category. The staffing management practices are tacitly judged as being producing both suitable situations (n=12) as well as unsuitable situations (n=21) due to insufficient quantitative personnel. This is the main focus of attention from the interviewees with a total of 33 mentioning it. Additionally, there were 11 interviewees mentioning the need to streamline the qualitative profile of some employees. Another dimension that emerged concerns the degree with which decisions are made centrally or in a decentralized manner. Only two interviewees focused on this issue. Another dimension concerned data management, namely how the IT system should develop to cover other, more comprehensive, functions (n=3). Another dimension was also only marginally mentioned (n=2) and concerns sourcing decisions, namely, if the hospital should use more outsourcing to meet its needs. Lastly, the most mentioned category (n=38) concerned staff role clarification and the existence of functional role overlap which creates issues. Some of these mentions are stating the roles are clear (n=15) but all the remaining ones expressed concern with lack of interdepartmental responsibilities and respective staffing role need for functional clarification as regards this topic (n=23). The results of the interviews on this section are shown in Table 3.5.

“Departments have a lot of things to do and are currently stretched” (L58)

“The staff number is basically sufficient, but the talent structure is bad”. (L42)

“Arbitrary demand for manpower of each department needs to be eliminated. (I3)

Informatization is seriously lagging behind. For example, staff cannot see the medical report on WeChat” (L53)

“To account for the staffing of third-party personnel into the total staffing. Need to consider the reasonableness of the number of third-party staffing” (I9)

“There is some crossover and unclear contents between department”. (L16, L18, L22, L26, L14, L28, L32, L48, L19, L49, L62, L50, L55)

Table 3.5 Table of categories and frequencies

Dimension	Category	Example	frequency
Staffing management practices	Quantitative match	Departments have a lot of things to do and are currently stretched. (L58)	33
	Qualitative match	The staff number is basically sufficient, but the talent structure is bad. (L42)	11
	Centralization	Arbitrary demand for manpower of each department needs to be eliminated. (I3)	2

Data management	Informatization is seriously lagging behind. For example, staff cannot see the medical report on WeChat. (L53)	3
Sourcing	To account for the staffing of third-party personnel into the total staffing. Need to consider the reasonableness of the number of third-party staffing (I9)	2
Role clarity	There is some crossover and unclear contents between department. (L16, L18, L22, L26, L14, L28, L32, L48, L19, L49, L62, L50, L55)	38
Total		88

3.3.4 Interview question #4 How do you evaluate the practices as regards competency-based management?

Competency-based management deserved attention mostly concerning performance appraisal (n=12) also because it is linked with compensation. Another focus of attention falls upon career promotion (n=6) which either highlights the need to improve the importance of ability (competence) or the need to create mechanisms that can demote employees that fail to meet standards. Lastly, a marginal mention to recruitment occurred with the concern about the lack of authority given to clinical department for hiring decisions. The results of the interviews on this section are shown in Table 3.6.

“No personnel authority” [in hiring] (L39)

“At present, there is a big problem that we only enroll the new staff without an elimination mechanism. There needs to be a mechanism for entry and elimination, promotion and demotion. (L50, L51)”

“The outpatient doctors will be assigned to the wards for unified management, so the bonus cannot be allocated according to the current standard that outpatient clinic and ward distribute the bonus separately. (L37)”

Table 3.6 Table of categories and frequencies

Dimension	Category	Example	frequency
Competency-based practices evaluation	Recruitment & Selection	No personnel authority [in hiring] (L39)	1
	Career promotion	At present, there is a big problem that we only enroll the new staff without an elimination mechanism. There needs to be a mechanism for entry and elimination, promotion and demotion. (L50, L51)	6
	Performance appraisal	The outpatient doctors will be assigned to the wards for unified management, so the bonus cannot be allocated according to the current	12

standard that outpatient clinic and ward
distribute the bonus separately. (L37)

Total

19

3.4 Discussion and conclusion of study 1

Findings are informative to the purposes of this study. Namely, they allow for a comprehensive understanding of the subjective experiences and judgments about staffing situation in the hospital and, mostly important, they suggested a set of dimensions that can be used to depict and evaluate the staffing management policies and practices in the hospital. This is an original contribution from this study as such policies are not systematized in akin literature and should also be evaluated considering the organizational context where they are implemented.

We conclude here about what are the most important dimensions one can use to depict a staffing management policy in a hospital. From our findings and categories, we reason there are four key dimensions to depict the staffing management policies. Also, synthesizing the results of existing literature and combining the information harvested from the interviews, we also summarized the fifth dimension that needs to be looked at (Title vs. Competency).

Firstly, decision making autonomy. This is without doubt one of the central topics in management as most of a managers' responsibility is to be able to make decisions on a daily basis. It is therefore not surprising to witness this dimension emerging from the qualitative analysis. The ongoing divergent view on decision making pertains to who should decide the allocation of staff. Some interviewers explored the degree of autonomy departments should have to make this allocation decisions and this seems to be a central dimension in organizational studies since the decision-making structure (its centralization, decentralization or emphasis on autonomy) is a common thread in literature. Both centralization and decentralization have advantages and disadvantages. Centralization does have the unique advantage of guaranteeing a standard that applies in a consistent way across the organizations. It ensures that decisions can be made quickly on certain matters at certain times. It allows for the coherent implementation of policies, which is in our opinion a required feature to its effectiveness and sense of fairness. However, centralizing processes, even with the aid of information technologies, is a time-consuming activity which implies the bureaucracy and time needed for a decision may just add burden to the already heavy workload. The timing can also be critical as centralized decision making can make it very difficult to make a quick decision and action even in case of an emergent issue that requires it. This is a well-known feature in bureaucracy. Conversely, decentralized decision making has the inverse advantages and disadvantages, but

it is mostly valued by the closer-to-operations knowledge which is often hard to grasp when the decision maker is not in daily contact with it. The caveat with it is the high probability of fragmentation and inability to hold single organization-wide policies that can prove effective. As in most issues in management, the Zhong Yong principle (the middle way) applies, and the degree of centralization may vary according to the contingencies. Still, this emerged as an important dimension that a staffing management policy must attend to.

The second dimension is data management. In the ongoing thinking about this dimension, the policies can diverge on who should be the primary source of data to measure if staff level is adequate or not? Should it be the departmental leader or more centralized system? In a decision process, data is fundamental, especially in a large complex system where the quality of the data and its processing will determine the accuracy of decisions. Again, this topic is indirectly related to the previous but highlights the origin of the data. Closer-to-operations data is richer in detail, and it can help in profiling the right skills and knowledge of a given job post or the exact need for more staff (or less staff, or different profiles). However, such department origin can also be biased by a well-known tendency to pressure for more resources, and likewise, for a tendency not to take into account the full needs of other departments. Conversely, a more higher-level data origin can bypass this parochial tendency, but it may also not be as aware as a departmental head about the true needs (or the ones that have higher priority). Still, this dimension plays a central role in conceiving staffing management policies.

The third dimension is sourcing. What is the role of hiring a third-party temporary workforce to face staffing need contingencies? How high can this percentage of outsourced professionals be not to create problems? This sourcing dimension pertains to a tension between stability and flexibility. On the one hand, staffing needs are not always the same and hospitals do have peaks and demands that might not be entirely compatible with a fixed workforce. Therefore, having the possibility to activate extra resources and providing flexible staffing is a must to effectively meet these needs without compromising too much the management efficiency. However, no hospital is expected to reasonably function if it does not rely on a stable workforce. Retaining the best professionals is one of the core challenges in current HRM, not only in healthcare but especially in healthcare, due to the large investment one has to do to develop a healthcare professional to the high levels of clinical requirements. The important question is to know when is HR outsourcing going over the optimum level? Albeit this is an open question, for sure, this dimension must be present when conceiving staffing management policies.

The fourth dimension is productivity optimization. This category emerged with a focus on how much should a hospital use productivity potential? How high can absenteeism be accepted before it harms the hospital efficiency? How high should workers motivation be to translate into higher productivity? And how much overtime is reasonable so to avoid burnout and other negative consequences for professionals and the hospital? This is an ever-central dimension in management. Although hospitals (as most organizations) are driven by their mission of savings lives, protecting the well-being of people and promoting health, no managerial system is fair if it does not demand itself optimum productivity. Especially in public organizations, that are funded with the State resources (meaning, all the people's money) such productivity is a fundamental value for managers. The dimension is deceptively simple because productivity can be fostered in many ways. As regards HRM, motivation plays a central role and some important indicators must be commonly agreed in a staffing management policy so to increase motivation (especially the intrinsic motivation), to increase job satisfaction and engagement, to decrease absenteeism as well as employee turnover. This is fundamental.

Lastly, a fifth dimension also emerged: Title vs. Competency. This ongoing discussion is of great interest since it translates two different ways of thinking about professional merit. Formal titles are important because they express an official assurance about professional skills, knowledge, attitudes, values and other dimensions that are desired in any healthcare professional. Although professional titles (job category) or the profession itself (doctor or nurse) is usually associated with competencies, it is true that it also reflects experience, or sometimes, just organization tenure. In a fast-changing professional domain such as healthcare, knowledge becomes obsolete quickly and continuous education is a must. It may occur that title might not always reflect such competency updating. So, competencies have been highlighted lately over title, because tenure can be important, but it does not guarantee updated competency. The ongoing discussion detaches competency from professional title thus opening doors to define policies more focused on title and formal qualifications, versus more focused-on measuring competencies to exert specific functions. This emphasis must be built-in the staffing management policies.

[This page is deliberately left blank.]

Chapter 4: Study 2 Quantitative Model Test

4.1 Introduction

Study 2 is a continuation study based on Study 1. Based on the results of the interviews in Study 1, we summarized five dimensions (decision making, data management, sourcing, productivity optimization, and title vs. competency) that can be used to describe the hospital's staffing management policy, and based on these dimensions, we designed a set of questionnaires to survey employees' perceptions of the hospital's current staffing management policies and conducted the questionnaires in the hospital in August 2022.

The questionnaires were released to three categories of personnel: the first was the first level of department directors, the second was team leaders, and the third was general staff (clinical and administrative staff). The content of the questionnaire was different for each type of staff, but all included socio-demographic information. After collecting all the questionnaires, the final data processing will be based on the data of the general staff, merging them with the data of the first-level department directors and team leaders, and finally analyzing the merged data.

In this part, we will report a quantitative test of the conceptual model proposed. To achieve this, we will start by describing how data was collected in the form of a questionnaire survey. Specifically, how the questionnaire survey was carried out in SZ Maternity and Child Healthcare Hospital, who was eligible to participate in such survey, what were the findings and their significance for staffing management in such an organizational setting.

In detail, we designed a set of questionnaires. The content of the questionnaire involved mainly around the 5 dimensions summarized in Study 1. The specific content of the questionnaire was designed around the 5 dimensions based on a comprehensive consideration of the literature review, combined with the opinions of the hospital leaders and middle-level cadres, which mainly included the measurement of variables in the conceptual model and the collection of some basic information. Considering the reliability and validity of the questionnaire, variables in the conceptual model were mainly measured based on mature scales in previous studies to the exception of Staffing Management Policies scale, which was measured based on findings from the 1st study (qualitative inductive study). In addition, the

questionnaire also contains a survey of some basic demographic information of the participants, such as age range, gender, organizational tenure, education.

After completing the data collection, this part report's reliability and validity indicators of the scales based on confirmatory factor analyses, so to ensure that such instruments are valid (that they measure the constructs they are intended to measure) and reliable (that they measure it always consistently), which is a fundamental condition for the overall validity of the subsequent analysis. Then, through descriptive analysis, correlation analysis, path analysis, and structural equations modelling, reports on findings are shown to sequentially test the hypotheses, i.e., to verify the direct, indirect and interaction effects between the variables previewed in the conceptual model.

The specific implementation details of each of the above steps will be introduced in detail in the rest of this part, which is mainly divided into three sections: methods, results, discussion and conclusion.

4.2 Method

4.2.1 Procedure

After approval to conduct the study on personnel allocation in SZ Maternity and Child Healthcare Hospital was granted, we received support by the hospital leadership, which has organized a mobilization meeting with the HR department to inform and facilitate data collection.

The source of data was based on the collation of questionnaire responses from all hospital staff (first-level directors, team leaders, clinical and administrative staff), and the questionnaire content was designed based on the literature review and the summary of the first stage interviews.

Because the study has a first phase that requires the availability of first-level directors, they were invited for an interview which was planned to last 30 minutes for a single interviewee, and the actual time may be increased or decreased depending on the progress of the interview. The main purpose of the interviews was to obtain the views of the hospital's middle-level cadres on the staffing management policy in order to collate the appropriate dimensions and content for describing people management policies, and to provide direction and reference for the subsequent development of the questionnaire.

The second phase comprised a survey by questionnaire. The content of the questionnaire is centered on the staffing management policy. The survey was conducted mainly for the staff of the hospital, aiming to understand the staff's views on the current staffing management policy. The survey was conducted in SZ Maternity and Child Healthcare Hospital, with questionnaires in printed version distributed and collected on site from staff in post targeting first-level directors, first-level deputy directors, second-level directors, second-level vice directors, head nurses, team leaders, and regular team members (physicians, nurses, other clinical and administrative staff). The target population for this study was estimated to be 1600 employees and an equivalent number of questionnaires were distributed. The hospital's full employee number is larger but we reasoned only those tenured more than one year would be able to answer as the perception of hospital management practices is not immediate and takes time to consolidate and become closer-to-reality.

4.2.2 Data entry and data analysis strategy

The answers from each team members' questionnaire were entered into rows, matched by the answers of the respective team leader and first-level directors, resulting in 1260 items. Some departments had more than one team leader, but we only selected one of them to be included in the analysis, for example, the Galactophore department surveyed three team leaders, 2 first-level deputy directors (code: 028, 029) and 1 Head Nurse (code: 030), and we only selected 029 to be included in the analysis, so 65 team leader's questionnaires were included. Criteria to select the leader whenever there was more than one was based on tenure. After data entry, the data were first checked for data entry quality, and then cured to check for unusable answers due to monotonous answers and missing data as well as for cases that did not have enough organizational tenure to be included in the analyses (less than 1 year). Finally, the filtered data are then incorporated into the subsequent analyses.

With a workable database, we started by testing the psychometric quality of the measures, i.e., we tested the construct validity of all variables by confirmatory factor analysis (CFA), except personnel management policies for which we used exploratory factor analysis due to its tentative nature. CFA indicates the extent to which the data fit the theoretical structure initially proposed, and the fit indices used for judgments were based on the recommendations of Heinrich (2001). To adopt cut-off points, we considered both the complexity of the model (based on the number of estimates) and the sample size, which in our case was essentially more than de 250.

According to best practice and recommendations (Heinrich, 2001) we adopted the normalized chi-square statistic (X^2/df , also referred as CMIN/DF), the comparative fit index (CFI), Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean residual (SRMR).

Fit indices are essential to judge the similarity between the estimated covariance matrix (the one theorized) with the observed covariance matrix (the empirical reality). The more mathematically similar the matrices are between each other, the better the fit of the theorized model. The null hypothesis states there are no differences between those matrices.

One of the fundamental indicators that gauge such similarity is the X^2 . This statistic is computed as Formula 4.1 shows where “N” stands for the sample size and the second term represents the differences between the observed model values and the proposed model values.

$$X^2 = \mathbf{f}[(N - 1)(S - \sum \mathbf{k})] \quad (4.1)$$

Because X^2 formula implies the value increases as the sample size grows, X^2 is often biased upwards when using large samples. Therefore, with a larger sample, the p -value of X^2 tends to decrease, thus rejecting the null hypothesis. For this reason, this statistic is often reported as Normed X^2 (CMIN/DF) which is the ratio of the X^2 to the degrees of freedom. Degrees of freedom are a measure of mathematical information and depend on the size of the covariance matrix while being immune to sample size effects. For such reason the normed X^2 is a more robust index than X^2 .

Another approach to fit indices departs from the idea that instead of focusing on absolute values, it is preferable to compare values obtained for the proposed model as against a baseline model (e.g. the null model that assumes no correlation between latent variables, or the saturated model that assumes a full correlated matrix). Such indices are called incremental fit index, of which CFI is credited example.

Being a normed index, CFI values range between 0 and 1. Because it is less sensitive to sample size bias, it is a common preferred complement to the X^2 statistic. Its formula is depicted in Formula 4.2 where “N” stands for the null model and “k” for the proposed model.

$$CFI = 1 - \frac{[X_k^2 - df_k]}{[X_N^2 - df_N]} \quad (4.2)$$

TLI is another incremental index, based on the comparison between CMIN for the null model (total absence of correlations) and the proposed model. Its formula is depicted in Formula 4.3.

$$\mathbf{TLI} = \frac{\left[\left(\frac{x_N^2}{df_N} \right) - \left(\frac{x_k^2}{df_k} \right) \right]}{\left[\left(\frac{x_N^2}{df_N} \right) - 1 \right]} \quad (4.3)$$

Statisticians have proposed a more sophisticated index to correct the sample size bias X^2 is prone to: RMSEA. The formula integrates not only a correction for sample size effects as it also has a correction for model complexity, i.e. the expression of the number of estimates. RMSEA is also reported with confidence intervals which offer a more robust decision on statistical significance. Its formula is depicted in Formula 4.4 where “N” stands for the sample size and “k” stands for the proposed model.

$$\mathbf{RMSEA} = \sqrt{\frac{(X^2 - df_k)}{(N - 1)}} \quad (4.4)$$

Another complex fit index that has deserved credit is the SRMR. This index is built on the reasoning that every covariance explained has a residual figure that expresses the error and, by standardizing such errors one can identify cases that are deviating too much (conventionally taking the $|4|$ as a threshold) and by averaging these deviations and standardizing it, the index will express the magnitude of such residuals. Its formula is depicted in Formula 4.5 where the term within parenthesis represents the residuals comprehending the “S” as the sample matrix and the “I” as the proposed model matrix.

$$\mathbf{SRMR} = \sqrt{\frac{1}{2} \sum (s_{ij} - I_{ij})^2} \quad (4.5)$$

Therefore, we used the following fit indices and respective cut-off values. The CMIN/DF should be below 3 and show insignificant p-values; the CFI is above .95, the TLI is above .95, RMSEA below .07, and the SRMR is below .08.

As in all uses of indicators, the good practice is to use multiple so to benefit from their advantages to compensate for the disadvantages of any. Hair et al. (2019) stress that the strictness with which one judges fit based on thresholds should take into account the sample size and model complexity. Stricter use should apply to more simple models, as well as to smaller samples. Likewise, alternative models should be compared so to gauge the likelihood that the model has better grounds than a competitive explanation.

Our first set of analysis pertaining to the hypotheses testing, focused on the role staffing management policies played in explaining quantitative and qualitative staff adequacy. To judge this, we conducted a multiple regression analysis where the staffing management policies were given the status of predictor variables to explain quantitative staff adequacy in a first analysis, and then qualitative staff adequacy in a final analysis (both taken as dependent variables).

To test the direct, indirect and interaction effects previewed in the conceptual model, we ran Hayes Model 8 that depicts the exact relationships we want to test. This model tests a moderated mediation where the interaction effects are expected to occur between the predictor (quantitative staffing inadequacy) and the mediator variable (work engagement) as well as between the predictor and the dependent variable (perceived team performance). We included as correlates the sociodemographic variables, namely: age, gender, organizational tenure, and education.

4.2.3 Sample

The sample covered the categories of first-level department directors, team leaders, and clinical and administrative staff, comprising 1323 healthcare professionals from SZ Maternity and Child Healthcare Hospital with at least 1 year experience in the organization. Respondents have differing levels of responsibility where 53 are 1st level directors, 65 are team leaders, and the remaining 1205 are clinical and administrative staff. Based on the actual number of questionnaires returned, it can be concluded that this sample corresponds to 89.75% response rate which is well within the range of good representation, showing a good response rate. This scenario occurs with all levels of hierarchical involvement as 53 of the 65 directors were involved (81.5%), and 123 of the 130 second-level directors were involved (94.6%) in this study although this last category was cut down to 65 workable answers due to dyadic mismatch with corresponding employee-level answers (as some departments can be small).

The sample is mostly feminine (82.3%), young (72.2% below 40 years-old, with an average falling in the 30-39 years-old range) and educated (27.4% higher education levels) and working in the organization on an average of 9.1 years (SD=7.43). Table 4.1 shows demographic information (mean age, age range, mean tenure, higher education rate) for all samples collected for different classifications of personnel (first-level directors, team leaders, other clinical and administrative staff).

Table 4.1 Sample description

	1 st level (Directors)	2 nd level (team leaders)	3 rd level (staff)
Sample size	53	65	1205
Mean age (SD)	50.31(6.81)	49.22(6.65)	2.02 (.888)
	≤29	0%	30.7%
	30-39	5.6%	43.8%
Age range	40-49	35.2%	41.54%
	50-59	59.2%	49.23%
	≥60	0%	5.7%
Mean tenure	20(9.3)	20.0(8.7)	9.1 (7.4)
%Higher education	64.8%	38.5%	27.4%

4.2.4 Measures

Staff adequacy was measured with Hudson and Shen (2018) understaffing scale comprising two dimensions: *quantitative understaffing* (3 items, e.g. “There are not enough employees in our work unit to complete all required job tasks”) and *qualitative understaffing* (3 items, e.g. “Our work unit needs employees with different skills from those the group currently possesses”) together with one item to check for overstaffing, both quantitative overstaffing (Considering the required job tasks and work volume, my work unit has too many employees) and qualitative overstaffing, also called, overqualification (People in my work unit generally have an education level above the requirements of the professional title or tasks they are doing). *1st level directors* were invited to answer this scale using a 5-point Likert scale (1=Strongly disagree to 5=strongly agree).

A CFA of this two-factor solution showed poor fit indices and issues pertaining to covariance matrix errors. We have thus conducted a Principal Component Analysis that showed reasonable validity indices (KMO=.570, Bartlett’s $X^2(15) = 2187, p<.001$) with two factors accounting for 63.1% of variance after rotation (Varimax) but the items from the qualitative staff adequacy had too low commonalities. By removing these items, we found a two-factor solution (KMO = .602, Bartlett’s $X^2(6) = 1774, p<.001$) accounting for 81.9% variance, where the second factor comprises a single item. The first component comprises the three original items measuring quantitative staff adequacy and has good reliability (Cronbach alpha = .838) as well as convergent validity (AVE = .683). As the correlation between the 1st component and the single item that represents qualitative staff adequacy is non-significant ($r = .013, p=.659$) there are no discriminant validity issues with this solution. Table 4.2 shows the above information.

Table 4.2 Rotated matrix for EFA staff adequacy

	1	2
QuanUS2	.942	-.030
QuanUS1	.860	-.019
QuanUS3	.803	.065
QualUS3	.008	.999
Cronbach alpha	.838	-
AVE	.683	-

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations.

Staffing Management Policies was measured with the scale originated from the 1st study (qualitative inductive study) and comprehends 13 items distributed by five dimensions:

1. Decision making: it refers to the centralization or decentralization of decision-making (2 items, “It is a good practice to allow departments of the hospital to decide on their own staffing needs”, and “It is a good practice to allow departments of the hospital to freely allocate work without a centralized decision making”).

2. Data management: the design of data collection and processing, and the use of IT, whether it is secure, efficient, and reliable (2 items, “It is better to collect data about staffing adequacy on the level of base workers rather than from the departmental director”, and “Any organization must have an integrated and efficient Information System to properly assess and monitor staffing levels”).

3. Sourcing: expresses the use of external labor and the need to hire personnel from third-party outsourcing companies to make up for existing staffing shortages (1 item, “It is a good practice to hire third-party temporary/rotating workforce to complement work peaks” plus and a contingent item to the first one, if positive (sourcing is 4 or 5) “What percentage of the total staff should be third-party? ____ %”).

4. Productivity optimization: whether the current productivity is optimal (4 items, “Considering the current manpower in the hospital I think we are using 100% of workers full productivity potential”, “The level of absenteeism in the hospital is not sufficiently high to harm its overall efficiency”, “The current level of workers motivation is good enough to promote high productivity”, and “The overtime practiced in the hospital falls within the reasonable number of hours and is not excessive”).

5. Title vs. Competency: are hospitals more focused on titles (meaning having a relevant position or professional or technical title) or competencies (other than titles that reflect one's abilities) (3 items, “Competency, more than formal title, is used in the Hospital as the key criterion to decide on career promotions”, “Competency, more than formal title, is used in the Hospital as the key criterion to recruit and select new employees”, “Competency, more than formal title, is used in the Hospital as the key criterion for performance appraisal”).

Team members were invited to answer this scale using a 5-point Likert scale (1=Strongly disagree to 5=strongly agree). For psychometric purposes we have chosen to collect the answers from these participants as they comprise the largest sample and this is a requirement to achieve comfortable sample-size to item-ratio levels, and it also has the advantage of avoiding common source bias (Podsakoff et al., 2003) because the staffing adequacy was collected from 1st level directors.

A Principal Components Analysis showed a solution that included one item with unacceptable commonality (Sourcing 1). We reason that this item has a distinguished nature

from the remaining and that it does not fit into a latent variable resulting from shared variance of the remaining items. Removing this item showed a solution that could accommodate 3 to 4 components. We opted for the four-component solution due to theoretical reasons. The analysis showed a valid solution ($KMO=.802$; $.672 < MSAs < .874$, Bartlett $\chi^2_{(55)}=4805$, $p<.001$) comprehending 11 items, all with commonalities above .500 and that explains 71.1% variance after rotation (Varimax) as shown in Table 4.3. All the loadings are above .660, and the components were: Productivity (4 items, Cronbach alpha=.721; AVE=.791), Competency (Cronbach alpha=.905; AVE=.509), Data Management (rSB=.622, AVE=.680), Decision Making (rSB=.736, AVE=.725). Because the scale is novel, Nunnally and Bernstein (1994) state reliability can be accepted for as low as .60.

Table 4.3 Rotated factor solution for staffing management policies

	Component			
	1	2	3	4
Comp25	.903	.168	.090	.109
Comp26	.891	.152	.112	.118
Comp24	.874	.221	.069	.052
Produc22	.166	.794	.091	.014
Produc23	.201	.728	.014	-.093
Produc21	.105	.664	.151	.202
Produc20	.094	.660	.230	.115
DM16	.113	.156	.852	.148
DM15	.097	.191	.851	.123
DataM17	.081	-.048	.179	.842
DataM18	.130	.200	.081	.808
Cronbach alpha	.721	.905	.736	.622
AVE	.791	.509	.725	.680

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

A CFA conducted on this factor solution showed good fit indices (Normed χ^2 (37)=4.52; CFI=.971; TLI=.959; RMSEA=.054 CI90 [.046; .062] PCLose=.194; SRMR=.0381; Holter ($p=.05$) = 372). Figure 4.1 shows the CFA factor loadings and structure.

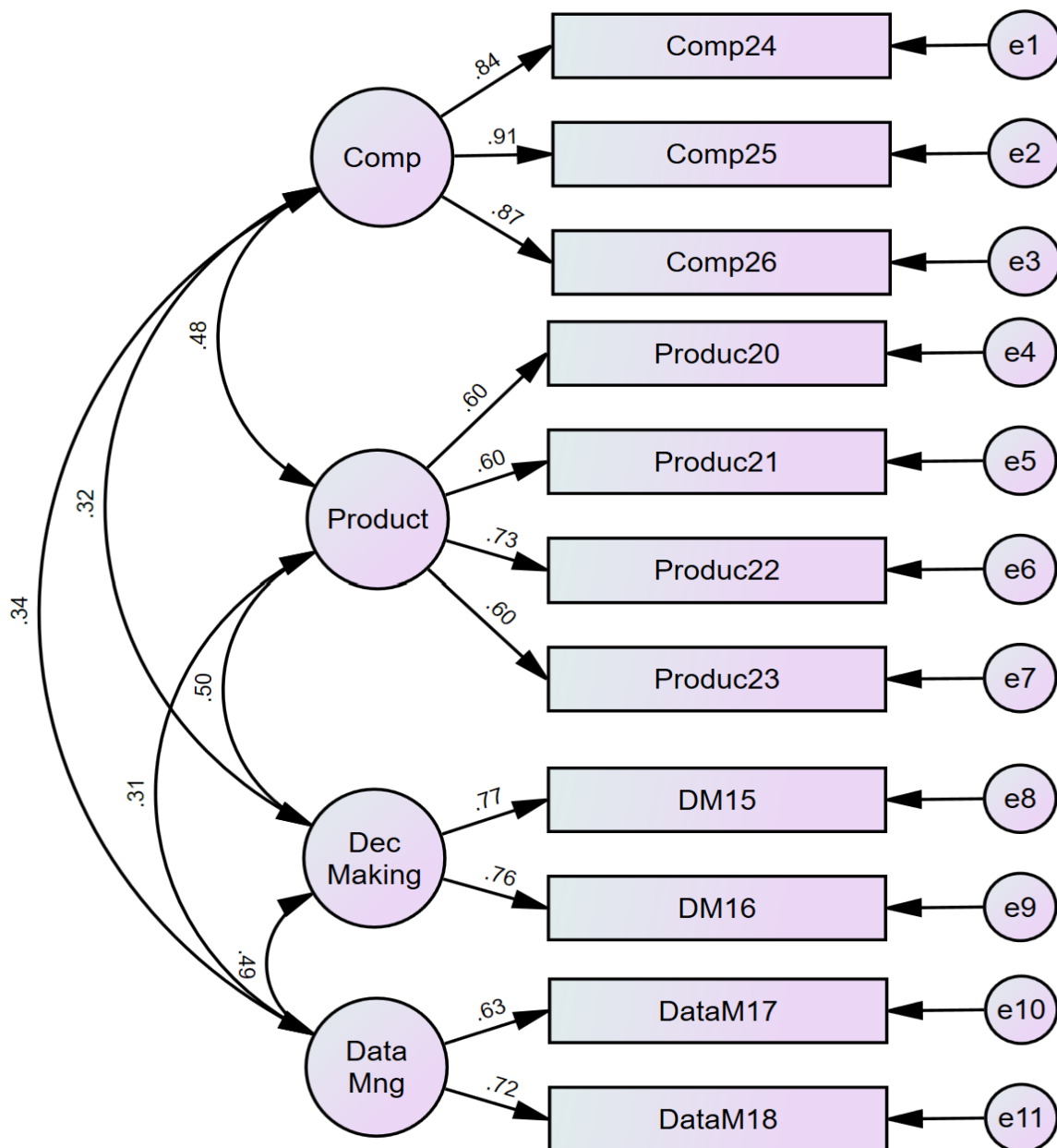


Figure 4.1 CFA for staffing management policies

Subjective team performance was measured with Conger, Kanungo and Menon (2000) scale comprehending five items (“1. The workgroup I supervise has high work performance.”, “2. In the workgroup I supervise most of our tasks are accomplished quickly and efficiently.”, “3. Workers in the workgroup I supervise always set a high standard of task accomplishment.”, “4. The workgroup I supervise always achieves a high standard of task accomplishment.”, “5. The workgroup I supervise almost always beat our targets.”).

Team leaders were invited to answer this scale using a 5-point Likert scale (1=Strongly disagree to 5=strongly agree). The Confirmatory Factor Analysis of the single factor solution

showed issues pertaining to RMSEA (.109, CI90 [.089; .132] PCLose=.000) and Lagrange multipliers suggested a covariance between the errors of the LTP3 and both LTP1 and LTP5 (they are indeed very similar) and the resulting factor solution has good fit indices (Normed χ^2 (3)=7.55; CFI=.995; TLI=.985; RMSEA=.074 CI90 [.047; .103] PCLose=.068; SRMR=.0113; Holter ($p=.05$) = 416). This solution has both good reliability (CR=.917) as well as high convergent validity (AVE=.689). Figure 4.2 shows the CFA factor loadings and structure for this sample.

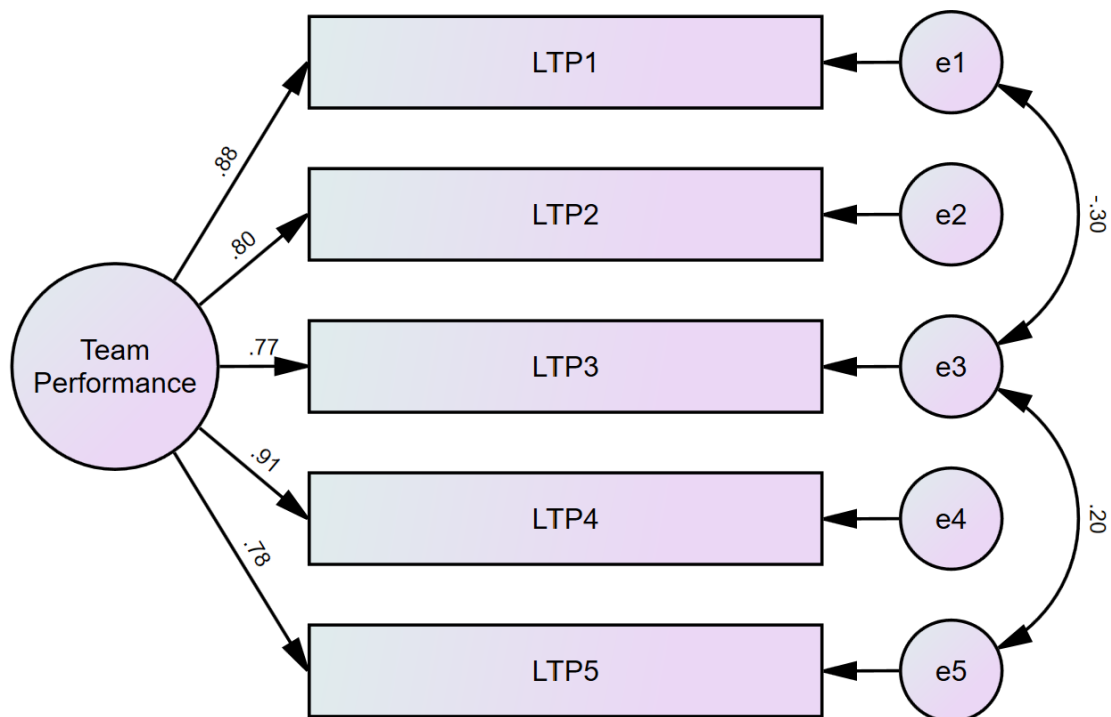


Figure 4.2 CFA for team performance as stated by team leaders

Team members were also invited to answer this scale using the same answering 5-point Likert scale. The Confirmatory Factor Analysis of the single factor solution showed issues pertaining to RMSEA (.109, CI90 [.089; .132] PCLose=.000) and Lagrange multipliers suggested a covariance between the errors of the first couple items (they are indeed very similar) and the resulting factor solution has good fit indices (Normed χ^2 (4)=4.262; CFI=.996; TLI=.989; RMSEA=.052 CI90 [.028; .079] PCLose=.398; SRMR=.0124; Holter ($p=.05$) = 671). This solution has both good reliability (CR=.867) as well as high convergent validity (AVE=.571). Figure 4.3 shows the CFA factor loadings and structure for this sample.

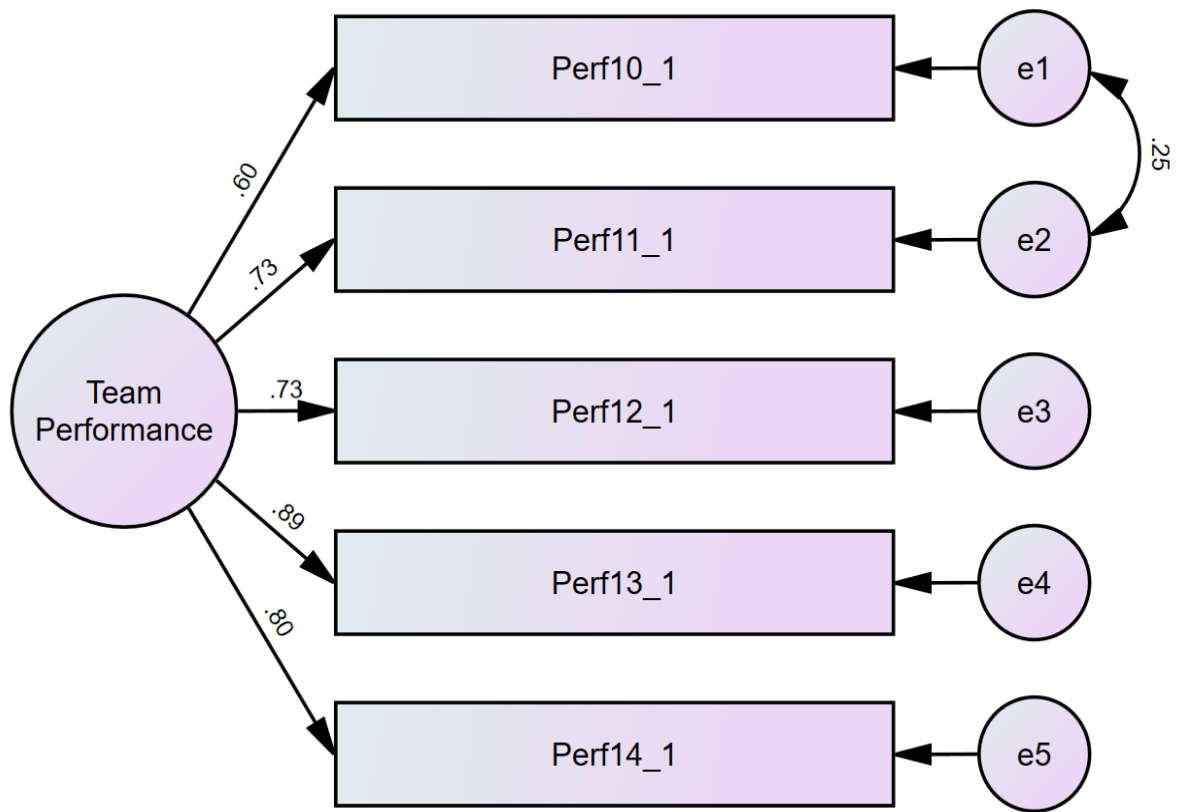


Figure 4.3 CFA for team performance as stated by team members

Work engagement was measured with Utrecht Work Engagement scale (Schaufeli & Bakker, 2004) comprehending 9 items distributed equally by three dimensions: vigor (“At my job, I feel strong and vigorous”, “At my work, I feel that I am bursting with energy”, “When I get up in the morning, I feel like going to work”), dedication (“I am enthusiastic about my job”, “My job inspires me”, “I am proud of the work that I do”), and absorption (“I feel happy when I am working intensely”, “I am immersed in my work”, “I get carried away when I’m working”).

Team members were invited to answer on a 7-point frequency scale (0=Never, 1=Almost never/A few times a year or less, 2=Rarely/Once a month or less, 3=Sometimes/A few times a month, 4=Often/Once a week, 5=Very often/A few times a week, 6=Every day). The Confirmatory Factor Analysis of the first order factors suggested a 2nd order factor due to high interfactor covariances. The first order factors are psychometrically sound as indicated by convergent validity ($AVE_{vigor}=.503$; $AVE_{dedication}=.767$; $AVE_{absorption}=.661$) as well as reliability ($CR_{vigor}=.746$; $CR_{dedication}=.908$; $CR_{absorption}=.853$). The 2nd order factor solution showed good fit indices (Normed χ^2 (22) =6.766; CFI=.984; TLI=.973; RMSEA=.069 CI90 [.059; .080]

PCLOSE=.001; SRMR=.0207; Holter ($p=.05$) = 275). The 2nd order factor has good reliability (CR=.97) as well as convergent validity (AVE=.92) corresponding to Figure 4.4.

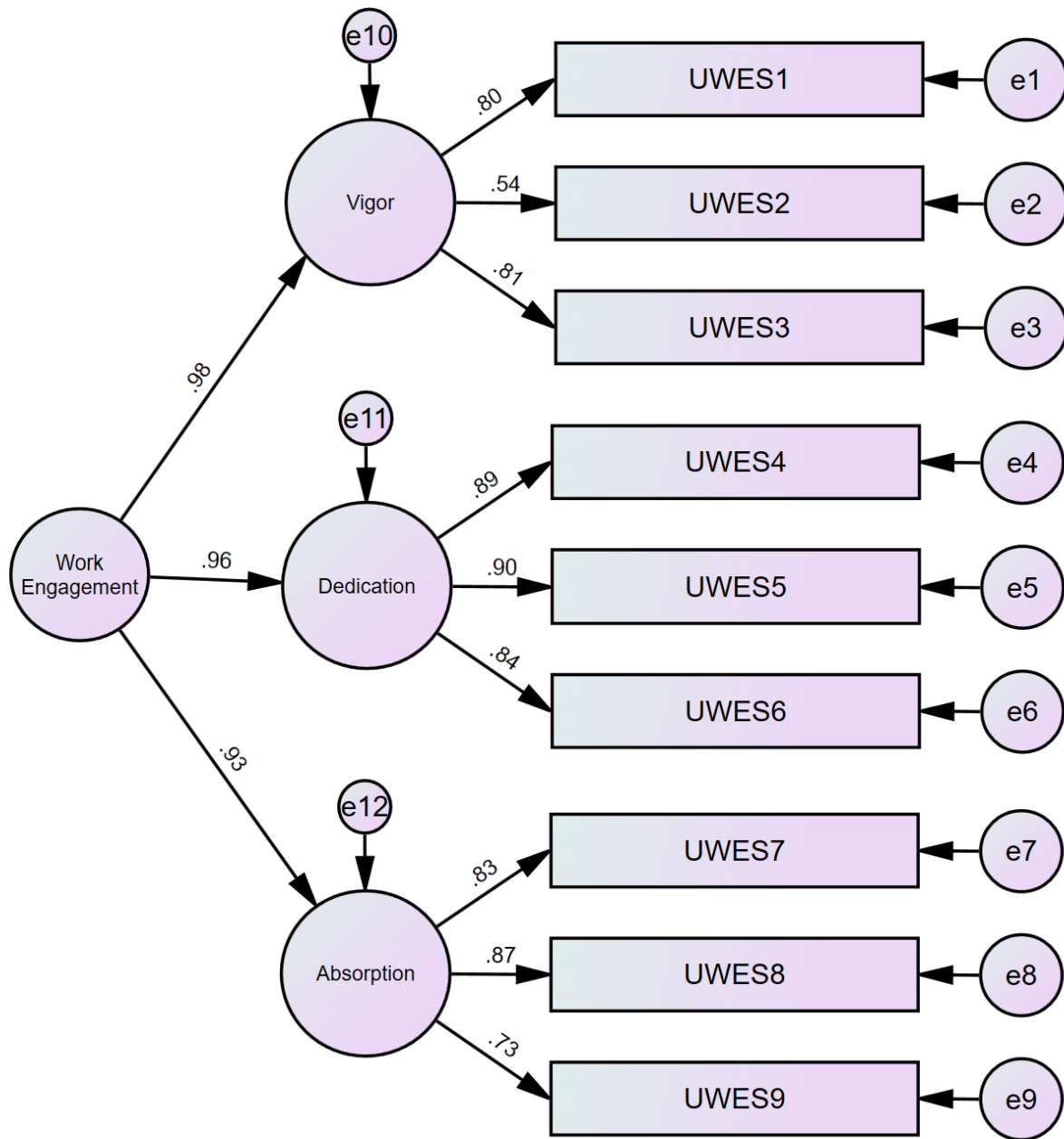


Figure 4.4 CFA for work engagement

Control variables included the general sociodemographics, namely: Age range (1="<29", 2="30-39", 3="40-49", 4="50-59", 5="60+"), Gender (1=Female, 2=Male), Organizational tenure (for our many years are you working here?), Education (1=Less than 12 years schooling, 2=Secondary (12 complete years schooling), 3=Post-secondary (Zhuanke), 4=Bachelor, 5=Master, 6=Doctorate/PhD).

4.3 Results

This section starts by showing the descriptive and bivariate analyses to understand the extent of demographic variables, the dimensions of staffing management policies, staffing adequacy (both qualitative and quantitative), and variables of team performance dimensions and how these variables correlate.

In the second part, it shows the findings for hypotheses testing showing goodness of fit for the structural equation models as well as the respective association coefficients (Lambdas) between staffing management policies and both quantitative and qualitative staffing adequacies.

It ends by showing findings for the second part of the conceptual model concerning direct, indirect and interaction effects within the variables, and respective interaction graphs whenever applicable.

4.3.1 Descriptive and bivariate analysis

The descriptive statistics indicate staffing management policies are mostly perceived as favoring competency instead of title ($m=3.66$, $sd=.81$), the decision making is partial to decentralized decision instead of centralized ($m=3.68$, $sd=.72$), root data collection at employee level instead of departmental directors ($m=3.98$, $sd=.60$), and there is opening to outsource staff to accommodate needs. Likewise, staffing issues (workforce, decision making criteria, data collection preferences) are perceived as being only moderately harming productivity ($m=3.54$, $sd=.64$). Work engagement is moderately high ($m=4.51$, $sd=.80$) and team performance is also in a similar level ($m=3.74$, $sd=.66$ in a maximum possible of 5 points). As regards staff adequacy, no one in the sample strongly agreed that qualitative staff was inadequate, and the average is very close to the scale's midpoint (2.5). Conversely, quantitative staffing seems to be acknowledged as an issue ($m=3.56$, $sd=.80$) as not a single participant strongly disagreed with the items expressing quantitative staff inadequacy and about one quarter (23%) of the sample signaled 4 or more, thus agreeing there is a quantitative staffing issue.

As regards correlations, sociodemographic variables are not greatly correlated with the variables in the conceptual model. Age shows not a single significant correlation ($p<.05$), organizational tenure has only a minor correlation with work engagement ($r=-.06$, $p<.05$) and shows nearly not significant correlation with others, gender has a suggestive correlation with the dependent variable where masculine participants report slightly higher level ($r=.074$, $p<.05$). More educated participants also report lower levels of perceived team performance, higher

levels of quantitative staff inadequacy and more agreement that staffing should consider data collection at root level.

Staffing management policies have but light correlations with reported staffing inadequacy (both quantitative and qualitative) among which the most relevant occurs between productivity optimization and both dimensions of staff inadequacy and has a negative valence ($r=-.082$, $p<.01$, and $r=-.059$, $p<.05$), meaning that the higher the optimization reported the lower the staff inadequacy, as expectable. Interestingly, quantitative and qualitative staff inadequacy have no correlation ($r=.013$, $p>.05$) suggesting they have distinct realities within the organization. The strongest cases of correlations, all positive, occur with work engagement (ranging from $r=.125$, $p<.01$, and $r=.480$, $p<.01$) as well as with team performance (ranging from $.218$, $p<.01$, and $r=.574$, $p<.01$). This suggests staffing management policies may exert a positive effect upon work engagement and team performance. Mirroring this relationship, work engagement was found to negatively correlate with staff quantitative and qualitative staff inadequacy (albeit of a modest magnitude, $r=-.066$, $p<.05$, and $r=-.081$, $p<.01$, respectively). A strong correlation occurs between work engagement and team performance, thus encouraging the conceptual model. Overall, the pattern of associations suggests the expected paths in the conceptual model may have a sound basis.

The descriptive statistical results among all the mentioned variables, including sample size, result range, mean value, and standard deviation, as well as the bivariate relationships among each variable (demographic variables and the variables mentioned in the structural equation model), are all reflected in Table 4.4.

Table 4.4 Descriptive and bivariate statistics

	N	MinMax	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Age	1168	1-5	2.02	.88	-											
2. Org.Tenure	1075	1-39	9.06	7.43	.736**	-										
3. Gender	1205	0-1	0.18	.48	-.060*	-.098**	-									
4. Education	1205	1-7	4.78	1.26	-.150**	-.169**	.086**	-								
5. SMP_Title vs. Competency	1200	1-5	3.66	.81	-.016	-.021	.053	-.030	-							
6. SMP_Productivity	1188	1-5	3.54	.64	-.050	-.079**	.071*	-.042	.402**	-						
7. SMP_Cent. vs. Decentr. decision	1197	1-5	3.68	.72	.033	.016	.035	-.009	.262**	.374**	-					
8. SMP_High level vs. Root data	1200	1-5	3.98	.60	.023	.044	.011	.063*	.243**	.197**	.335**	-				
9. Insourcing vs. Outsourcing	1205	1-5	3.83	.80	-.004	.028	.043	.014	.204**	.205**	.231**	.361**	-			
10. Work Engagement	1185	1-6	4.51	.80	.021	-.066*	.043	-.021	.285**	.480**	.223**	.125**	.146**	-		
11. Quantitative Staff Inadequacy	1205	2-5	3.56	.80	.023	.029	.006	.063*	.033	-.082**	.035	.033	.063*	-.066*	-	
12. Qualitative Staff Inadequacy	1205	1-4	2.54	.93	-.056	.014	-.037	-.018	.060*	-.059*	.012	.042	-.014	-.081**	.013	-
13. Team Performance (team members)	1190	1-5	3.74	.66	-.016	-.034	.074*	-.066*	.293**	.574**	.400**	.218**	.198**	.553**	-.077**	-.065*

* $p < .05$; ** $p < .01$

4.3.2 Hypotheses testing

The first part of the model concerns the hypothesized relationship between staffing management policies and staffing inadequacies, both quantitative and qualitative. To test the association between staffing management policies and quantitative and qualitative staffing, we have designed a structural equations model where the four staffing management policies (title vs competency, productivity, decision making, data management) are treated as predictors or quantitative and qualitative staffing adequacy. Because these last constructs did not operate as latent variables, we opted to treat them as formative constructs and therefore, we included as dependent variables in the model their composite index.

The SEM showed a valid model with good fit indices (Normed X^2 (83) = 3.21; CFI = .968; TLI = .941; RMSEA = .043 CI90 [.037; .049] PCLose = .978; SRMR=.0381; Holter ($p=.05$) = 475) with significant estimates ($p<.05$).

After controlling for the effects of gender, age, education, and organizational tenure, it is obvious to see the correlation coefficient between the four staffing management policies and the staffing inadequacy both in quantitative and qualitative aspects, and then summarize the correlation relationships between these variables. It shows that **title_vs_competency** is positively associated with quantitative staffing inadequacy ($\lambda=.102$, $p<.01$) and is also positively associated with qualitative staffing inadequacy ($\lambda = .111$, $p<.01$). On the contrary, **productivity** is negatively associated with both quantitative staffing inadequacy ($\lambda = -.182$, $p<.001$) and qualitative staffing inadequacy ($\lambda = -.143$, $p<.01$). **Decision making** is significantly associated only with quantitative staffing inadequacy ($\lambda=.095$, $p<.05$), and has no significant relationship with qualitative staffing inadequacy. **Data management** is not associated with any of these.

The results above are all shown in Table 4.5 as below.

Table 4.5 Estimates for SMP-staffing adequacy model

	Quantitative Staff Inad					Qualitative Staff Inad				
	Lambda	Estimate	S.E.	C.R.	p-value	Lambda	Estimate	S.E.	C.R.	p-value
Title vs competency	.102**	.110	.040	2.731	.006	.111**	.139	.047	2.973	.003
Productivity	-.182***	-.268	.070	-3.838	<.001	-.143**	-.245	.080	-3.049	.002
Decision making	.095*	.123	.063	1.973	.049	.029	.064 ^{n.s.}	.072	.884	.377
Data management	.016 ^{n.s.}	.027	.079	.336	.737	.016	.056 ^{n.s.}	.092	.614	.539
Age	.007 ^{n.s.}	.007	.041	.163	.871	-.126	-.133**	.047	-2.805	.005
Gender	-.063*	-.132	.064	-2.079	.038	-.053	-.130 ^{n.s.}	.074	-1.756	.079
Education	.060*	.039	.019	2.041	.041	-.028	-.021 ^{n.s.}	.022	-.958	.338
Organizational tenure	.014 ^{n.s.}	.001	.005	.299	.765	.073	.009 ^{n.s.}	.006	1.573	.116

* $p < .05$; ** $p < .01$; *** $p < .001$

These results indicate that the more individuals report the hospital puts emphasis on competencies instead of titles, the more they tend to perceive insufficient number of staff, indicating that more staff should be hired for the hospital, and the more they tend to perceive there is a lack of high-quality staff, showing that there is a need to hire staff in different skill profile. Results also indicate that the more individuals perceive the hospital has optimized its productivity, the less they think the hospital is lacking staff and lacking the right skills profile. Results also indicate that the more individuals perceive the hospital is decentralizing staffing decisions to the departmental level, the more they think there is quantitative staff inadequacy, but there is no significant relationship between the decision making and qualitative staff inadequacy. The results show no significant relationship between data management and the staffing inadequacy in both quantitative and qualitative.

Overall, findings support hypothesis 1 as staffing management policies are seemingly impactful into quantitative and qualitative staff adequacy, as reported by participants.

The second part of the model deals with direct, indirect, and interactive interactions in the structural equation model. The direct effects mainly include demographic variables and qualitative and quantitative staffing inadequacy on work engagement and perceived team performance, as well as the direct effect of job participation and perceived team performance. The interaction effect mainly includes the interaction between staffing inadequacy (both quantitative and qualitative) and job engagement and perceived performance. The indirect effect mainly reflects the indirect effect between quantitative staffing shortage and perceived performance. These results directly reflect the correlations between each variable and the strength of the correlation and can therefore show whether the proposed hypothesis can be verified.

Specifically, the second part of the model pertained to the process relationship that connects both quantitative and qualitative staff adequacies (treated as an interaction effect) to team performance via work engagement. For parsimony's sake, we report all findings in Table 4.6.

Table 4.6 Direct, indirect and interaction effects

Dependent variable	Work Engagement					Perceived Performance				
	B	SE	t	Boot LLCI	Boot ULCI	B	SE	t	Boot LLCI	Boot ULCI
Direct effects										
Constant	4.24	.20	21.09	3.84	4.63	1.57***	.17	9.31	1.240	1.903
Age	.16***	.04	3.84	.080	.248	-.04	.03	-1.35	-.099	.018
Org. Tenure	-.02***	.01	-4.24	-.031	-.011	.00	.00	.83	-.004	.010
Gender	.09	.06	1.44	-.034	.224	.15**	.05	3.25	.059	.238
Education	-.01	.02	-.62	-.061	.031	-.02	.02	-1.11	-.051	.014
Quantit. Staff Inadeq.	-.07*	.03	-1.97	-.135	-.001	-.05*	.02	-2.14	-.090	-.004
Qualit. Staff Inadequacy	-.04	.03	-1.15	-.094	.012	.00	.02	.03	-.036	.037
Work_Engagement						.44**	.02	19.49	.393	.481
Interaction effect										
QuantStaff*QualitStaff	-.14***	.04	-3.71	-.215	-.066	-.09***	.03	-3.55	-.146	-.042
Single slope										
QualitStaff low	.06	.04	1.69	-.010	.138	.04	.03	1.40	-.015	-.088
QualitStaff High	-.20***	.06	-3.39	-.316	-.084	-.14***	.04	-3.39	-.220	-.059
Indirect effect										
QuantitStaff low						.03	.02		-.005	.062
H4 QuantitStaff avr.						-.03	.02		-.060	.001
QuantitStaff High						-.09	.03		-.139	-.037
Index moderat. mediation										
R ²	4.3%					31.9%				

* $p < .05$, ** $p < .01$, *** $p < .001$

Table shows that after controlling for gender, age, education, and organizational tenure, quantitative staff inadequacy has a negative effect on perceived performance ($B = -.05$, $CI95[-.090; -.004]$) supporting *hypothesis 2*. Similarly, findings show that quantitative staff inadequacy is a predictor of work engagement ($B = -.07$, $CI95[-.135; -.001]$) with a negative valence, thus supporting *hypothesis 3*.

We also found that the relationship between work engagement and perceived performance is significant and positive ($B = .44$, $CI95[.393; .481]$) which suggests the hypothesized indirect effect of quantitative staff inadequacy on team performance via work engagement is possible. However, the test showed a non-significant coefficient ($-.03$, $SE = .02$, $CI95 [-.060; .001]$) thus rejecting *hypothesis 4*. It is important to mind that the conceptual model theoretically previews a possible interaction effect with qualitative staffing inadequacy and thus this finding is valid only for the unconditional statement.

As regards the interaction with qualitative staffing inadequacy, findings show quantitative staff inadequacy interact with qualitative staff inadequacy, resulting in a significant negative effect on perceived performance ($B = -.09$, $CI95[-.146; -.042]$). Specifically, the relationship between quantitative staff inadequacy and perceived performance is significantly negative ($B = -.14$, $CI95[-.220; -.059]$) when the qualitative staff inadequacy level is high, while at a low qualitative staff inadequacy level, the relationship between quantitative staff inadequacy and perceived performance is not significant. This indicates that the high level of qualitative staffing shortage will strengthen the negative impact of quantitative staffing shortage on perceived team performance. When the staff report low staffing quality, the more insufficient the number of personnel, the worse the perceived team performance will be, and this negative effect will become more significant with the serious situation of the staff quality shortage. When people report high quality of staff, the effect of insufficient number of personnel on perceived team performance is very weak.

Figure 4.5 shows the impact of the interaction between qualitative and quantitative staffing inadequacy on perceived team performance.

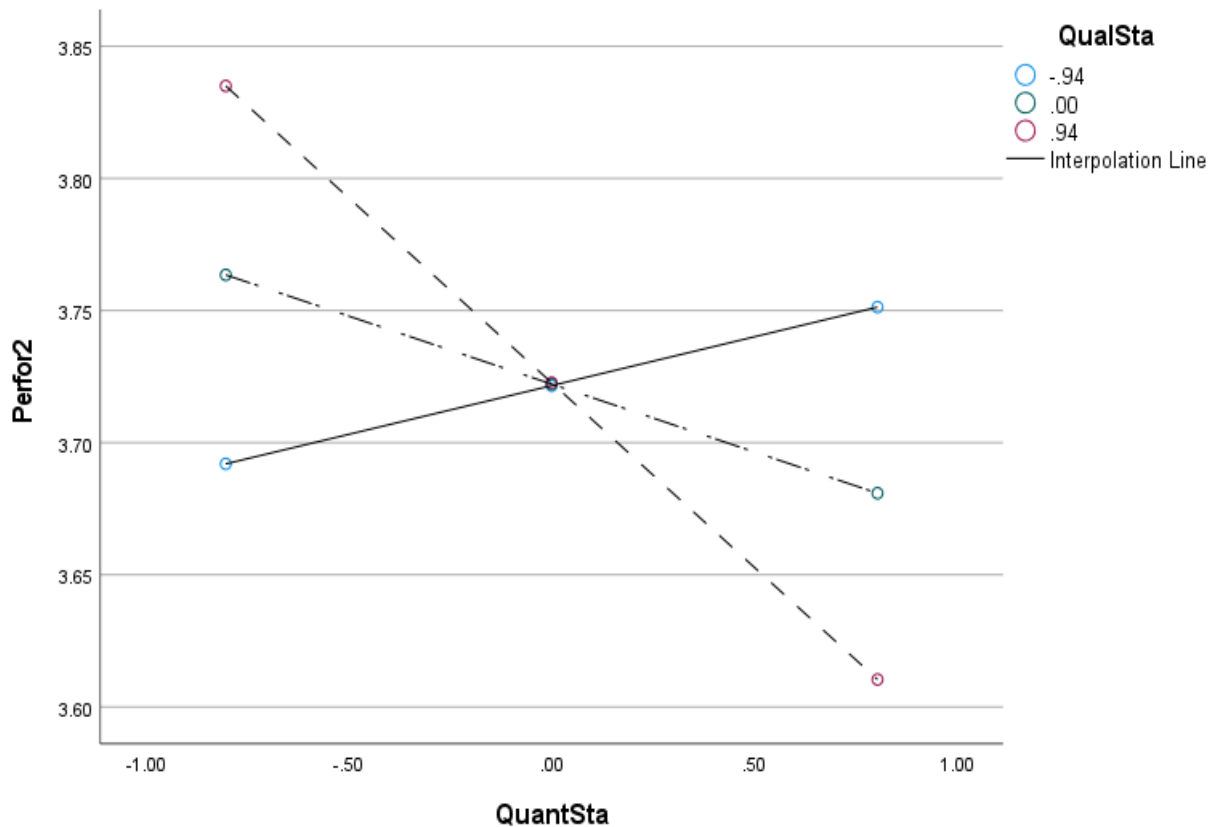


Figure 4.5 Moderating effect diagram $\text{QuanS} * \text{QualS} \rightarrow \text{TeamPerformance}$

In addition, the results in Table 4.6 also show that qualitative staffing inadequacy interacts with quantitative staffing inadequacy in predicting work engagement ($B = -.14$, $CI95[-.215; -.066]$) which encourages the moderated mediated effect. When the qualitative staff inadequacy level is high, the indirect effect of quantitative staff inadequacy on perceived performance via work engagement is significant ($B = -.09$, $CI95[-.139; -.037]$), while the indirect effect is not significant ($B = .03$, $CI95[-.005; .062]$) when the qualitative staff inadequacy is at the average and low levels.

This suggests that qualitative staff inadequacy moderates the relationship that quantitative staff inadequacy effects perceived performance through work engagement, and this negative relationship becomes stronger in the presence of a high level of qualitative staff inadequacy. Indeed, we further conducted a simple slope analysis to test the difference in the relationship between quantitative staff inadequacy and work engagement at different levels of qualitative staff inadequacy. When the qualitative staff inadequacy is at a high level, the relationship between quantitative staff inadequacy and work engagement is significantly negative ($B = -.20$, $CI95[-.316; -.084]$), while the relationship between quantitative understaffing and work engagement is not significant at a low level of qualitative staff inadequacy. This suggests that qualitative staff inadequacy moderates the relationship between quantitative staff inadequacy

and work engagement. Under a high level of qualitative staff inadequacy, quantitative staff inadequacy has a stronger negative effect on work engagement. The interaction is depicted in Figure 4.6. Thus, findings support the moderated mediation effect as stated in *hypothesis 5*.

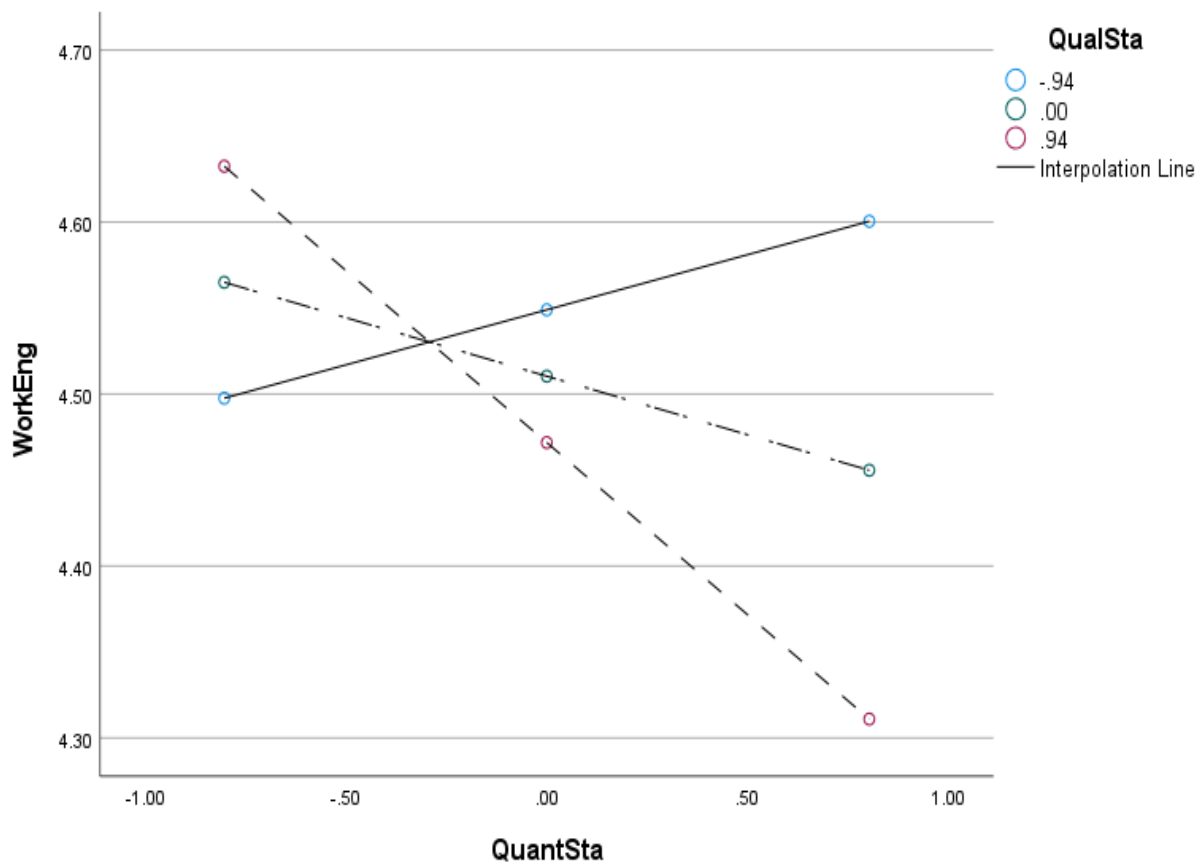


Figure 4.6 Moderating effect diagram $\text{QuanS} * \text{QualS} \rightarrow \text{WorkEngagement}$

At the light of these findings, we must consider that hypothesis 4 does not receive empirical support in its unconditional statement but the indirect effect is conditional to the level of qualitative staffing inadequacy.

4.4 Discussion and conclusion

Study 2 is a derivative study based on Study 1, and is based on a summary of the possible dimensions of staffing management policies to understand what opinions and perceptions current hospital employees have about the current staffing policies, as well as to understand the basic current staffing situation (quantitative and qualitative staffing adequacy), the impact of staffing situation on employee job engagement and team performance, and the interaction relationships between the dimensions of staffing management policies and job engagement and team performance.

This empirical study was designed to ascertain to which extent do staffing management policies affect staffing adequacy (both quantitative and qualitative) and how these interact to produce a positive psychological status (work engagement) which leads, both directly and indirectly, to a heightened work team performance in a Chinese healthcare context.

The conceptual model was then designed to test five hypotheses namely: H1 (Staffing management policies impact the level of quantitative and qualitative staffing inadequacy), H2 (Quantitative Staffing Inadequacy is negatively associated with perceived team performance), H3 (Quantitative Staffing Inadequacy is negatively associated with work engagement), H4 (Quantitative Staffing Inadequacy exerts a negative indirect effect on Team performance via work engagement), and H5 (The indirect effect of Quantitative Staffing Inadequacy on Team performance via work engagement interacts with Qualitative Staffing Inadequacy in such a way that when Qualitative Staffing Inadequacy is high the negative indirect effect is stronger, but when Qualitative Staffing Inadequacy is low, the negative indirect effect is weaker).

Globally, the first hypothesis refers to the policy-to-practice process, the second, third and fourth hypotheses refer to how quantitative staffing adequacy leads directly and indirectly to team performance, and the last hypothesis refers to how qualitative staffing adequacy should also be equated to fully understand how the process works.

Findings show the impact of staff management policies on human resource allocation is mainly reflected in the following three aspects: staff competency and title, productivity, and decision-making.

Regarding *competency and title*, leaders who tend to believe that actual competency is important are more likely to believe that the department is understaffed and needs more personnel with different skills. This is consistent with the actual situation. Currently, education and title are common indicators for recruiting and evaluating talents and are linked to salary performance, so employees will try to improve their education level and title to get higher salary. However, the actual ability required for some positions is not very related to the education and title. For example, the ability to adapt, communication, logical thinking, and comprehensive handling ability that required for administrative management positions are not significantly related to the education and title. Therefore, for those positions that require practical ability, although the hospital recruits many highly educated and high-titled talents, the leaders who value practical ability still see a shortage of staff. This finding also provides a direction for future recruitment and job hiring. For those positions that require practical ability or department leaders focus more on practical skills, employees with better practical ability instead of having better education background and titles should be deployed. These results

indicate that the more individuals report the hospital puts emphasis on competencies instead of titles, the more they tend to perceive insufficient number of staff and the need to hire different skill profile staff.

Concerning the *impact on productivity*, it is logical that respondents believe that the hospital with higher level of productivity optimization has less staff shortage, (both on qualitative and quantitative dimensions), since productivity optimization level can basically reflect improvements on both staff quantity and quality. Findings pertaining the relationship between productivity optimization and staffing quantitative and qualitative inadequacy are logical since the reasoning about productivity optimization (in the way it was questioned) should mirror a sense of small margin to improve in both achieving the right number of employees and the right profile in recruitment. Study 1 crystallizes productivity into four specific observed variables: the degree of human resource potential, absenteeism, motivation, and overtime. An organization with a good productivity system is one in which people are working to their full potential, employees are highly motivated, absenteeism is low, and overtime is moderate. On the contrary, if employees are not highly motivated and often work overtime, section leaders in this state of production tend to feel that there are not enough staff.

Regarding the *impact on decision-making*, department heads who tend to believe that staffing decisions should be decentralized to their sections are more likely to believe that quantitative staffing is inadequate. Although literature tends to favor decentralization in HRM as a measure of increasing the departmental leaders' engagement with the overall HR decisions, findings concerning centralization versus decentralization in staffing showed that centralization seems to be helpful into avoiding understaffing or overstaffing. This is also logical because each department will struggle to increase existing resources and may not be aware of the needs of other departments. Only from a central position is it possible to understand where more resources for some become excessive, especially due to the lack of resources for other department. An interesting finding is the lack of relation between this with the qualitative staffing, since apparently some departments may be better in determining which qualitative profile should be hired and other departments not as good as a centralized decision. This justifies why no significant association was found.

The findings also supported the second and third hypotheses thus indicating there is a negative relationship between quantitative staffing inadequacy and perceived team performance, which is consistent with the mainstream findings that understaffing leads to increased workload of employees (Cho et al., 2020; Dall'Ora et al., 2020), which in turn causes

fatigue, negative emotions, and decreased productivity, ultimately leading to a decrease in team performance (Armstrong, 2006; Pahos & Galanaki, 2019).

This study used a 5-point Likert scale developed by Conger et al. (2000) to test team leader's perception of performance, which better reflects the actual situation of team performance, because team leader is the leader closest to the production line and is most sensitive to the perception of team performance. Agyepong et al. (2004) found that overload changes employees' psychological perception (i.e. internal psychological representations), which in turn decreases employee engagement and leads to a decrease in performance output. The model shows a negative relationship between quantitative staffing inadequacy and employee engagement, and quantitative staffing inadequacy exerts a negative indirect effect on team performance via work engagement. We can thus conclude, in line with most research, that work engagement is a key issue in managing healthcare professionals (Wee & Lai, 2021).

It is clear that not quantitative understaffing is not the only factor that affects team performance. Qualitative understaffing is also an active factor affecting team performance (Dogba & Fournier, 2009; Knight et al., 2013; Pouramin et al., 2020). Based on this, the research aimed to figure out the pathways through which qualitative understaffing could affect team performances. Findings did show that the indirect effect of quantitative staffing inadequacy on team performance via work engagement interacts with qualitative staffing inadequacy in such a way that when qualitative staffing inadequacy is higher, the negative indirect effect is stronger, and when qualitative staffing inadequacy is lower, the negative indirect effect is weaker. This has important implications both for theory as well as practice.

As regards theory, our findings add to extant knowledge by extending the focus on quantitative understaffing, adding the qualitative dimension. The interaction found means that no research on staffing management is completed without focusing on both dimensions especially because qualitative seems to play a leveraging role in the whole process.

In practice, departments with more skilled staff ensure a certain level of productivity, and the higher productivity can mask to some extent the decline in performance due to inadequate quantitative staffing levels. These departments tend to accomplish their work goals, have better performance output, and do not experience so strongly the need to recruit. Conversely, if departments lack skilled staff, more staff will be needed to accomplish the stated work objectives, in which case the qualitative understaffing further amplifies the decline in team performance due to quantitative understaffing.

The model testing shows that staffing management policies indeed affect both qualitative and quantitative understaffing (department leaders' common perception of department

understaffing), and that staffing profiles (both qualitative and quantitative) in turn have impacts on team performance in a variety of ways. In other words, under the moderation of staffing management policies, human resource allocation (both qualitative and quantitative understaffing) has an impact on team performance.

[This page is deliberately left blank.]

Chapter 5: General Discussion and Conclusion

One cannot overstate the importance of health in people's life as popular wisdom state "Good health is over wealth (健康是最大的财富)" recognizing the prevailing importance of health over any other consideration. Therefore, one must acknowledge that Healthcare HRM has always been an important issue.

This thesis analyzes the existing problems of healthcare HRM in China and carried out two studies from a qualitative and quantitative perspectives to systematically analyze the impact of staffing management policies and (in)adequacy of quantitative and qualitative staffing on health workers team performance.

Study 1 is a qualitative study that analyzes and summarizes the dimensions and indicators that describe hospital staffing policies. Staffing policy plays a key role in the healthcare field. However, through a systematic review of the literature, we found that the previous studies have not formed a complete and clear dimension and indicator to describe the healthcare HRM policy.

We have opted for a case study as it has a more context-controlled situation which we reasoned to be an important dimension in researching this topic because staffing management complexity is very much dependent on context, and without this circumscription we would not be able to rule out all interfering contextual variables. Therefore, study 1 reported this case study in which a 3A maternal and child health hospital is selected as the subject of the study. This hospital is representative in that it is the largest maternal and child health care institution in SZ and is now a well-known 3A maternal and child health care hospital in China that integrates medical treatment, health care, teaching, research, and prevention. The hospital has two sites, Hongli Hospital Area and Fuqiang Hospital Area, covering a total area of 35000 square meters, with a construction area of 150000 square meters and 1300 hospital beds. The annual number of outpatient and emergency visits is more than 2 million, the number of discharges is nearly 50000, and the number of deliveries is nearly 20000. With the development of medical care, the hospital is facing some challenges in human resource management and personnel management policies. How to manage human resources well and achieve high quality development of the talent team is the focus of hospital managers who have been seeking breakthroughs. In order to understand the current situation of the hospital's business and the allocation of human resources, interviews were conducted with senior hospital managers. The

interviews were conducted around the degree of matching personnel with work objectives and the work efficiency output to obtain the hospital leaders' evaluation of the adequacy of human resources needed to achieve the hospital's goals. In addition, to understand the staffing, job optimization, and expectations of manpower allocation in each department, interviews were conducted with department leaders around the themes of departmental responsibilities, staffing structure, and room for job optimization. Interview results were divided into four categories by literature review and content extraction, which are: 1. What is the current situation regarding the headcount? 2. What are the impacts of the staffing current situation? 3. How do you evaluate the staffing management practices? 4. How do you evaluate the practices as regards competency-based management? Findings from content analysis showed five central dimensions should be used to characterize staffing management policies: decision making (centralized vs. decentralized), data management, external procurement, expected productivity, and competencies versus job titles. These dimensions formed the basis to elaborate a questionnaire which is applicable to investigate employee management policies and their consequences. Our original contribution was the systematic depiction of staffing management system while also describing the staffing management policy with the five key dimensions. This study laid a solid foundation for a comprehensive and accurate understanding of the current situation of hospital human resources allocation and management.

This first study was an answer to a research gap we found in literature pertaining to the staffing management policies and that was needed to be dealt with to further test how staffing management situation explains human resources and performance outcomes.

Another research gap motivated the conceptual model: the review of the literature showed us that few studies have incorporated both the shortage of hospital staff and the lack of staff with the right skills into the theoretical model, i.e. the quantitative and qualitative staffing dimensions. This is an important research gap because focusing on only one of these dimensions is missing the point as it is unreasonable to focus only on having the right ratio of employees without consideration for their competencies and other features that impact the quality and performance of their work, but it is also unreasonable to focus only on such competency profiles without considering the workforce ratios staffing needs.

Study 2 was conducted to test the conceptual model based on an overview of existing HRM policy studies. This model proposes five corresponding hypotheses. To summarize: Hypothesis 1: Staffing management policies impact the level of quantitative and qualitative staffing inadequacy; Hypothesis 2: Quantitative Staffing Inadequacy is negatively associated with perceived team performance; Hypothesis 3: Quantitative Staffing Inadequacy is negatively

associated with work engagement; Hypothesis 4: Quantitative Staffing Inadequacy exerts a negative indirect effect on Team performance via work engagement, and Hypothesis 5; Qualitative staffing inadequacy has a modulating effect upon the indirect effect stated as shown by interaction effects where inadequacy hampers the indirect effect while adequacy enables or increments it. Ultimately, the most central hypothesis is the last one that proposes a complex moderated mediation model.

As stated, the topic is complex and such complexity stems also from the interaction of multiple people involved in policy making, management and employees themselves. Therefore, three versions of a questionnaire were developed and intended to collect data from three different important stakeholders: The first one targeted employees' perceptions of staff management policies and employee engagement. The second one targeted departmental leaders' perceptions of qualitative and quantitative staffing inadequacy in the department. The third one was intended to survey team leaders' perceptions of departmental performance outputs. The questionnaire survey was carried out in SZ Maternity and Child Healthcare Hospital. The questionnaires were distributed by paper questionnaires and on-site collection and the participants included staff at various levels in the hospital. After completing the questionnaire collection, valid questionnaires were obtained through certain screening procedures, and the collected data were used to test the model. Findings suggest that staffing management policies do affect qualitative and quantitative understaffing in three main ways: 1. The more individuals report the hospital emphasizes competencies instead of titles, the more they tend to perceive insufficient number of staff and the need to hire different skill profile staff. 2. The more individuals perceive the hospital has optimized its productivity, the less they think the hospital is lacking staff and lacking the right skills profile. 3. The more individuals perceive the hospital is decentralizing staffing decisions to the departmental level, the more they think there is quantitative staff inadequacy. Moreover, the findings shows that quantitative understaffing is negatively related to team performance and employee engagement, and that employee engagement plays a mediating role in the relationship between quantitative understaffing and team performance. Also, the findings prove that the indirect effect of quantitative staffing inadequacy on team performance via work engagement interacts with qualitative staffing inadequacy in such a way that when qualitative staffing inadequacy is higher, the negative indirect effect is stronger, and when qualitative staffing inadequacy is lower, the negative indirect effect is weaker.

This study innovatively introduced qualitative and quantitative understaffing variables to test how staffing management policies can restrict staffing adequacy in a healthcare institution

in SZ, China, and how qualitative and quantitative staffing inadequacy affect team performance. The results reveal the important mechanism of the impact of staffing management policies, quantitative and qualitative personnel shortage on team performance, which has rich theoretical value.

In general, compared with the existing academic studies, this thesis innovatively establishes five key dimensions to describe the staffing management policy, helping scholars and managers to have an in-depth understanding of hospital human resource allocation. In addition, this paper innovatively established a theoretical model for the impact of variables such as hospital staffing management policies, quantitative and qualitative staffing inadequacy on team performance, which enriches the understanding of existing research on the mechanism affecting healthcare team performance, and effectively supplements the literature related to healthcare HRM.

5.1 Theoretical contributions

Based on existing research, this thesis has certain innovative and theoretical significance in discussing the policies of staffing management and proposing and demonstrating the relationship between the policies of staffing management and staffing adequacy, work engagement and team performance:

(1) Formulate and evaluate staffing management policies systematically

The existing research on the dimensions involved in staffing management policy is vague. However, we need to obtain more detailed understanding of it, especially in the context of China, to better guide relevant HRM practices and achieve better practice results and outputs. In this study, a qualitative approach was adopted to systematically elaborate and evaluate staffing management policies based on a large sample of SZ Maternity and Child Healthcare Hospital, and a set of dimensions that can be used to describe and evaluate hospital staffing management policies and practices was proposed. Although this result has certain timeliness and applicability, it is enough to provide direction and basis for related impact research and future expansion research.

(2) Reveal the interaction between the quantitative and qualitative dimensions of staffing inadequacy

Existing research on staffing management has not focused on these two dimensions simultaneously. Based on extant research, this study expands the focus on staffing inadequacy, into both quantitative and qualitative dimensions of staffing inadequacy. It is found that the two dimensions interact with work engagement and team performance, and particularly qualitative

staffing inadequacy plays a moderating role in this relationship. This study supplements the existing research staffing management on the research object level.

5.2 Managerial implications

As mentioned, HRM practices can bring higher performance outputs to hospitals. However, for HRM to play its due positive role, organizational decision makers and HRM practitioners must know where to focus their efforts to achieve effective HRM practices. Staffing is without much doubt one of the most important practices in HRM. Based on existing findings, this study focuses on the matching between staffing requirements and staffing practices. Starting from the inductive study of the dimensions of staffing management policies, this study proposes the impact of staffing management policies on the two dimensions of staffing (quantitative staffing and qualitative staffing), as well as the relationship with work engagement and team performance, and draws a series of conclusions. Managers can base their staffing policies decisions by focusing on the five dimensions we uncovered while acknowledging that meeting staff ratios is not enough as a qualitative profile is also required to make such ratios meaningful. We trust our findings bring certain enlightenment for the construction and operation of hospital HRM department.

(1) Correctly define the functions of HRM department, and exert the dynamic coordination and control ability

After making clear the importance of HRM practice to the development of hospitals, it also puts forward higher requirements for the construction of hospital HRM department. This study finds that staffing management policies will affect the staffing inadequacy of hospitals, which in turn will affect the staff's work engagement and team performance. Therefore, from the perspective of staffing, the HRM department of a hospital needs to master the core business objectives of the hospital and the overall situation of human resource allocation, deeply learn the knowledge related to personnel allocation management policies, and clarify its responsibilities in personnel allocation: Its responsibilities are no longer limited to the collation of human resource information and the mobilization arrangement of human resources within the hospital, but need to analyze the matching of human resource supply and demand, that is, to evaluate the adequacy of human resources needed to achieve organizational goals. Meanwhile, the HRM department should play its role of dynamic coordination and control and adjust the evaluation results in time. This will improve the effectiveness of hospital HRM practices and thus improve performance.

(2) Improve the personnel allocation management policy, establish a sound human resources adequacy evaluation system, improve the matching of human resources supply and demand within the hospital

Staffing management policies are critical. This study found that staffing management policies can improve the quantity and quality of hospital staffing inadequacy, which will negatively affect employee's work engagement and team performance. Therefore, hospital managers need to improve their staffing management policies, timely adjust the staffing objectives and tasks according to the internal and external environment changes; Establish a sound evaluation system for the adequacy of human resources, deeply analyze the staffing needs and staffing practices of various departments of the hospital and find out the problems in the allocation of human resources in the hospital. When a mismatch is found, hospitals need to adjust quickly and improve staffing policies to address the shortfall in human resources. This will contribute to the improvement of hospital performance and long-term healthy development.

(3) Incorporating a theory of the impact of staffing policies on performance in healthcare organizations.

Based on theories such as motivation theory, AMO theory, SET theory, P-J fit theory, and JD-R, the research proposes a conceptual model including five modules of staffing management policy, quantitative staffing adequacy, qualitative staffing adequacy, work engagement, and team performance, and correspondingly proposes five hypotheses, and analyzes the role of quantitative and qualitative staffing adequacy in explaining work engagement and team performance by testing the hypotheses.

(4) Insights on personnel management.

By testing Hypothesis 1 that states staffing management policies impact the level of quantitative and qualitative staffing inadequacy, we can conclude that leaders who tend to believe that practical skills are important tend also to believe that the department is understaffed and needs more people with different skills. Therefore, medical institutions should pay more attention to the actual competencies of employees in recruitment, selection, and promotion, especially in some positions that require actual competence (e.g., the actual competencies required for administrative positions may involve the ability of adaptation, communication, logical thinking, comprehensive processing ability, among others), and break the stereotypical thinking of appointing talents based on academic qualifications and titles. When establishing a talent appraisal system, it is also important to fully consider the actual competencies of employees as an important aspect of appraisal.

Our study found that those department directors who tend to believe that staffing decisions should be delegated to their departments are more likely to believe that the quantity of staff is inadequate. As a public hospital, strategic decisions such as hospital development planning and human resource planning should be made centrally at the hospital level, and the current human resource size in Chinese hospital is also controlled in total. For example, some local documents stipulate that tertiary maternity and child healthcare institutions are configured according to a man-bed ratio of 1.7:1. At the departmental level, the production organization system should be continuously optimized in order to reduce overtime and improve staff motivation and satisfaction. We found in our study that respondents felt that hospitals with higher levels of productivity optimization were less short-staffed, which gives us an insight that when departments give feedback about shortage of staff, they may be able to improve productivity and make up for the shortage of staff by improving the organizational production system, and the optimization should be based on an in-depth study of the department's operation and human resource allocation. Through joint efforts at the hospital level and department level, a lean and efficient talent team can be established to provide a talent guarantee to promote the high-quality development of public hospitals.

5.3 Research limitations and prospects

5.3.1 Research limitations

Like all studies, ours has limitations that highlight areas for future research.

Firstly, the research data of this study are all from a single medical institution in SZ, China, and the data from one medical institution may not be universal, which cannot reflect the impact of the staffing management policies of all parts of China or other countries. In addition, we lack robust tests for the conclusions of the model, so it may have an impact on the universality of the results of the experiment. However, we trust these understaffing challenges are universally reported and the requirements to overcome these challenges should also be commonly shared across hospitals.

Secondly, in the qualitative study, we identified five dimensions of staffing management policies (such as decision making, data management etc.), based on this categorization, a 13-item scale was produced, and its psychometric quality ascertained. However, the selection of these dimensions may be subjective, which cannot fully summarize the staffing management

policy, and may have deviation in the research results. Still, the scale was subjected to validity and reliability testing which encourages its possible use in other settings.

Thirdly, in the quantitative research of this experiment, taking work engagement as a mediator between quantitative staffing adequacy interaction with qualitative staffing adequacy in explaining team performance may omit other important mediators, or there may be more intervening variables, which need further research.

5.3.2 Research prospects

The model proposed by us shows that staffing management policies indeed affect both qualitative and quantitative understaffing (department leaders' common perception of department understaffing), and that staffing profiles (both qualitative and quantitative) in turn have impacts on team performance in a variety of ways, which is helpful to better design staffing management policies and increase the staffing fit so to improve team performance.

In the future, data can be collected from medical institutions all over the country and even the world (not limited to SZ) and conduct robust tests on the conclusions drawn from the model, so as to verify the rationality and universality of the experimental conclusions. This can also be extended to international settings. In the construction of the conceptual model, one may be able to further find new intermediary variables (not just work engagement), or find the synergy of multiple intermediary variables, and use these variables to link the relationship between quantitative and qualitative staffing adequacy, so as to further explain the impact on team performance.

In general, it is our hope that the measures developed in this research and the findings presented here will promote increased attention to these issues in the future as we seek to better understand and theorize staffing management.

Bibliography

- Adapa, K., Pillai, M., Foster, M., Charguia, N., & Mazur, L. (2022). Using explainable supervised machine learning to predict burnout in healthcare professionals. *Studies in Health Technology and Informatics*, 294, 58-62.
- Adeosun, O. T., & Ohiani, A. S. (2020). Attracting and recruiting quality talent: Firm perspectives. *Rajagiri Management Journal*, 14(2), 107-120.
- Agarwal, V., Mathiyazhagan, K., Malhotra, S., & Saikouk, T. (2021). Analysis of challenges in sustainable human resource management due to disruptions by industry 4.0: An emerging economy perspective. *International Journal of Manpower*, 43(2), 513-541.
- Agyepong, I. A., Anafi, P., Asiamah, E., Ansah, E. K., Ashon, D. A., & Narh - Dometey, C. (2004). Health worker (internal customer) satisfaction and motivation in the public sector in ghana. *The International Journal of Health Planning and Management*, 19(4), 319-336.
- Al-Amin, M. (2016). Hospital characteristics and 30-day all-cause readmission rates. *Journal of Hospital Medicine*, 11(10), 682-687.
- Al-Amin, M., & Li, K. (2019). Hospitalists staffing levels and hospital performance. *Health Services Research*, 55(1), 44-53.
- Alexander, E. C., Mader, D. R. D., & Mader, F. H. (2019). Using social media during the hiring process: A comparison between recruiters and job seekers. *Journal of Global Scholars of Marketing Science*, 29(1), 78-87.
- Ali, S. A. M., Said, N. A., Yunus, N. a. M., Kader, S. F. A., Latif, D. S. A., & Munap, R. (2014). Hackman and oldham's job characteristics model to job satisfaction. *Procedia-Social and Behavioral Sciences*, 129, 46-52.
- Allan, C. (1998). The elasticity of endurance: Work intensification and workplace flexibility in the queensland public hospital system. *New Zealand Journal of Industrial Relations*, 23(3), 133-151.
- Anarani, A., Mauro, C. D., & Giammanco, M. D. (2018). Linking organizational climate to work engagement: A study in the healthcare sector. *International Journal of Public Administration*, 42(7), 547-557.
- Ansah Ofei, A. M., Paarima, Y., Barnes, T., & Kwashie, A. A. (2021). Staffing the unit with nurses: The role of nurse managers. *Journal of Health, Organisation and Management*, 35(5), 614-627.
- Anwar, G., & Abdullah, N. N. (2021). The impact of human resource management practice on organizational performance. *International Journal of Engineering, Business and Management*, 5(1), 35-47.
- Araslı, H., & Arıcı, H. E. (2018). The art of retaining seasonal employees: Three industry-specific leadership styles. *The Service Industries Journal*, 39(3-4), 175-205.
- Armstrong, M. (2006). *A handbook of human resource management practice*. Kogan Page Publishers.
- Attridge, M. (2009). Measuring and managing employee work engagement: A review of the research and business literature. *Journal of Workplace Behavioral Health*, 24(4), 383-398.
- Auerbach, D. I., Buerhaus, P. I., & Staiger, D. O. (2020). Implications of the rapid growth of the nurse practitioner workforce in the us. *Health Affairs*, 39(2), 273-279.
- Austin, J. T., & Villanova, P. (1992). The criterion problem: 1917-1992. *Journal of Applied Psychology*, 77(6), 836-874.
- Bakker, A. B., & Albrecht, S. (2018). Work engagement: Current trends. *Career Development*

- International*, 23(1), 4-11.
- Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory: Taking stock and looking forward. *Journal of Occupational Health Psychology*, 22(3), 273-285.
- Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. I. (2014). Burnout and work engagement: The jd–r approach. *Annual Review of Organizational Psychology and Organizational Behavior*, 1(1), 389-411.
- Becker, B. E., Huselid, M. A., & Ulrich, D. (2009). The hr scorecard: Linking people, strategy and performance. *Management Research News*, 32(3), 297-299.
- Beeber, A. S., Zimmerman, S., Madeline Mitchell, C., & Reed, D. (2018). Staffing and service availability in assisted living: The importance of nurse delegation policies. *Journal of the American Geriatrics Society*, 66(11), 2158-2166.
- Bernardin, H. J., & Beatty, R. W. (1984). *Performance appraisal: Assessing human behavior at work*. Kent Publishing Company.
- Blau, P. M. (1964). *Exchange and power in social life*. Wiley.
- Blšťáková, J., & Palenčárová, J. (2021, July 13-15). *Human resource management in healthcare*. SHS Web of Conferences, EDP Sciences.
- Bonfim, D., Mafra, A., da Costa Palacio, D., & Rewa, T. (2022). Assessment of staffing needs for registered nurses and licensed practical nurses at primary care units in brazil using workload indicators of staffing need (wisn) method. *Hum Resour Health*, 19(Suppl 1), 130.
- Borgogni, L., Consiglio, C., Alessandri, G., & Schaufeli, W. B. (2012). “Don't throw the baby out with the bathwater!” interpersonal strain at work and burnout. *European Journal of Work and Organizational Psychology*, 21(6), 875-898.
- Borman, W. C., & Motowidlo, S. (1993). Expanding the criterion domain to include elements of contextual performance. In N. Schmitt & W. C. Borman (Eds.), *Personnel selection in organizations* (pp. 71-98). Jossey Bass.
- Boselie, P. (2010). High performance work practices in the health care sector: A dutch case study. *International Journal of Manpower*, 31(1), 42-58.
- Boxall, P., & Purcell, J. (2016). *Strategy and human resource management*. Hampshire: Palgrave Macmillan.
- Boyko, V. (1999). Methods for diagnosing the level of burnout. In D. Y. Raigorodskii (Ed.), *Practical psycho diagnostics: Methods tests* (pp. 161-169). Samara.
- Breaugh, J. A. (1981). Relationships between recruiting sources and employee performance, absenteeism, and work attitudes. *Academy of Management Journal*, 24(1), 142-147.
- Buchan, J., & Aiken, L. (2008). Solving nursing shortages: A common priority. *Journal of Clinical Nursing*, 17(24), 3262-3268.
- Buerhaus, P. I., Donelan, K., Ulrich, B. T., & Norman, L. (2005). Hospital rns' and cnos' perceptions of the impact of the nursing shortage on the quality of care. *Nursing Economics*, 23(5), 214.
- Cai, Y., Li, Q., Cao, T., & Wan, Q. (2023). Nurses' work engagement: The influences of ambidextrous leadership, clinical nurse leadership and workload. *Journal of Advanced Nursing*, 79(3), 1152-1161.
- Cassels, A., & Organization, W. H. (1997). *A guide to sector-wide approaches for health development: Concepts, issues and working arrangements*. World Health Organization.
- Cavouras, C. A. (2002). Nurse staffing levels in american hospitals: A 2001 report. *Journal of Emergency Nursing*, 28(1), 40-43.
- Chai, P., Zhang, Y., Zhou, M., Liu, S., & Kinfu, Y. (2019). Health system productivity in china: A comparison of pre- and post-2009 healthcare reform. *Health Policy and Planning*, 35(3), 257-266.
- Cheese, P. (2010). Talent management for a new era: What we have learned from the recession and what we need to focus on next. *Human Resource Management International Digest*,

- 18(3), 3-5.
- Chen, Q., Liang, M., Li, Y., Guo, J., Fei, D., Wang, L., He, L., Sheng, C., Cai, Y., Li, X., Wang, J., & Zhang, Z. (2020). Mental health care for medical staff in china during the covid-19 outbreak. *The Lancet Psychiatry*, 7(4), e15-e16.
- Chen, S., Sam, X. H., Soong, A., Car, L. T., Lian, S., & Smith, H. E. (2022). Recruitment of general practitioners in china: A scoping review of strategies and challenges. *BMC Primary Care*, 23(1), 1-14.
- Cho, S. H., Lee, J. Y., You, S. J., Song, K. J., & Hong, K. J. (2020). Nurse staffing, nurses prioritization, missed care, quality of nursing care, and nurse outcomes. *International Journal of Nursing Practice*, 26(1), e12803.
- Chow-Chua, C., & Goh, M. (2002). Framework for evaluating performance and quality improvement in hospitals. *Managing Service Quality: An International Journal*, 12(1), 54-66.
- Chowhan, J., Denton, M., Brookman, C., Davies, S., Sayin, F. K., & Zeytinoglu, I. (2019). Work intensification and health outcomes of health sector workers. *Personnel Review*, 48(2), 342-359.
- Christian, M. S., Garza, A. S., & Slaughter, J. E. (2011). Work engagement: A quantitative review and test of its relations with task and contextual performance. *Personnel Psychology*, 64(1), 89-136.
- Cimiotti, J. P., Aiken, L. H., Sloane, D. M., & Wu, E. S. (2012). Nurse staffing, burnout, and health care-associated infection. *American Journal of Infection Control*, 40(6), 486-490.
- Conger, J. A., Kanungo, R. N., & Menon, S. T. (2000). Charismatic leadership and follower effects. *Journal of Organizational Behavior*, 21(7), 747-767.
- Cook, K. S., Cheshire, C., Rice, E. R. W., & Nakagawa, S. (2013). Social exchange theory. In J. DeLamater & A. Ward (Eds.), *Handbook of Social Psychology* (pp. 61-88). Dordrecht: Springer Netherlands.
- Cooke, F. L., & Bartram, T. (2015). Guest editors' introduction: Human resource management in health care and elderly care: Current challenges and toward a research agenda. *Human Resource Management*, 54(5), 711-735.
- Cooke, F. L., & Zhan, C. (2013). Between market and bureaucracy: Public healthcare reforms in china and nurses' terms and conditions. *The International Journal of Human Resource Management*, 24(16), 3178-3195.
- Cooper, S. L., & Zaske, D. E. (1987). Relationship between intensity of hospital services and pharmacy workload. *American Journal of Health-System Pharmacy*, 44(10), 2267-2271.
- Cox, K. B. (2003). The effects of intrapersonal, intragroup, and intergroup conflict on team performance effectiveness and work satisfaction. *Nursing Administration Quarterly*, 27(2), 153-163.
- Cropanzano, R., Anthony, E. L., Daniels, S. R., & Hall, A. V. (2017). Social exchange theory: A critical review with theoretical remedies. *Academy of Management Annals*, 11(1), 479-516.
- Dall'Ora, C., Saville, C., Rubbo, B., Turner, L., Jones, J., & Griffiths, P. (2022). Nurse staffing levels and patient outcomes: A systematic review of longitudinal studies. *International Journal of Nursing Studies*, 134, 104311.
- Dall'Ora, C., Ball, J., Reinius, M., & Griffiths, P. (2020). Burnout in nursing: A theoretical review. *Human Resources for Health*, 18(1), 1-17.
- Dasgupta, P. (2016). Work engagement of nurses in private hospitals. *Journal of Health Management*, 18(4), 555-568.
- Datta, D. K., Guthrie, J. P., & Wright, P. M. (2005). Human resource management and labor productivity: Does industry matter? *Academy of Management Journal*, 48(1), 135-145.
- Delery, J. E., & Doty, D. H. (1996). Modes of theorizing in strategic human resource

- management: Tests of universalistic, contingency, and configurations. Performance predictions. *Academy of Management Journal*, 39(4), 802-835.
- Dogba, M., & Fournier, P. (2009). Human resources and the quality of emergency obstetric care in developing countries: A systematic review of the literature. *Human Resources for Health*, 7(1), 7.
- Dussault, G. (2001). Cadre pour l'analyse de la main-d'œuvre sanitaire. *Ruptures Revue Transdisciplinaire Santé*, 7(2), 64-78.
- Dussault, G., & Dubois, C.-A. (2003). Human resources for health policies: A critical component in health policies. *Human Resources for Health*, 1(1), 1-16.
- Edwards, J. R. (1991). Person-job fit: A conceptual integration, literature review, and methodological critique. *International Review of Industrial and Organizational Psychology*, 6(2), 283-357.
- Elliott, D. J., Young, R. S., Brice, J., Aguiar, R., & Kolm, P. (2014). Effect of hospitalist workload on the quality and efficiency of care. *JAMA internal medicine*, 174(5), 786-793.
- Emanuele, R., & Higgins, S. H. (2000). Corporate culture in the nonprofit sector: A comparison of fringe benefits with the for-profit sector. *Journal of Business Ethics*, 24(1), 87-93.
- Fan, D., Cui, L., Zhang, M. M., Zhu, C. J., Härtel, C. E. J., & Nyland, C. (2014). Influence of high performance work systems on employee subjective well-being and job burnout: Empirical evidence from the chinese healthcare sector. *The International Journal of Human Resource Management*, 25(7), 931-950.
- Fanti, M. P., Mangini, A. M., Dotoli, M., & Ukovich, W. (2013). A three-level strategy for the design and performance evaluation of hospital departments. *IEEE Transactions on Systems, Man, and Cybernetics: Systems*, 43(4), 742-756.
- Fiabane, E., Giorgi, I., Sguazzin, C., & Argentero, P. (2013). Work engagement and occupational stress in nurses and other healthcare workers: The role of organisational and personal factors. *Journal of Clinical Nursing*, 22(17-18), 2614-2624.
- Franken, E., Plimmer, G., Malinen, S., & Bryson, J. (2021). Growing and adapting during continuous change: Building employee resilience in the public sector. In R. Pinheiro, M. L. Frigotto, & M. Young (Eds.), *Towards resilient organizations and societies* (pp. 143-170). Palgrave Macmillan, Cham.
- Freudenberger, H. J. (1974). Staff burn-out. *Journal of Social Issues*, 30(1), 159-165.
- Fylan, F. (2005). Semi-structured interviewing. *A handbook of research methods for clinical and health psychology*, 5(2), 65-78.
- Gao, H., Chen, H., Feng, J., Qin, X., Wang, X., Liang, S., Zhao, J., & Feng, Q. (2018). Balanced scorecard-based performance evaluation of chinese county hospitals in underdeveloped areas. *Journal of International Medical Research*, 46(5), 1947-1962.
- Garcia, B. L., Meador, M., & Kleiner, B. (2003). How to hire the right person the first time. *Nonprofit World*, 21(2), 9-11.
- Garrett, C. (2008). The effect of nurse staffing patterns on medical errors and nurse burnout. *AORN Journal*, 87(6), 1191-1204.
- Giao, H. N. K., Vuong, B. N., Huan, D. D., Tushar, H., & Quan, T. N. (2020). The effect of emotional intelligence on turnover intention and the moderating role of perceived organizational support: Evidence from the banking industry of vietnam. *Sustainability*, 12(5), 1857.
- Gil-Monte, P. R., & Figueiredo-Ferraz, H. (2012). Psychometric properties of the 'spanish burnout inventory' among employees working with people with intellectual disability. *Journal of Intellectual Disability Research*, 57(10), 959-968.
- Glouberman, S., & Mintzberg, H. (2001). Managing the care of health and the cure of disease—part i: Differentiation. *Health Care Management Review*, 26(1), 56-69.
- Grace, E. S., Wenghofer, E. F., & Korinek, E. J. (2014). Predictors of physician performance

- on competence assessment. *Academic Medicine*, 89(6), 912-919.
- Grant, A. M. (2007). Relational job design and the motivation to make a prosocial difference. *Academy of Management Review*, 32(2), 393-417.
- Guo, Y., Shibuya, K., Cheng, G., Rao, K., Lee, L., & Tang, S. (2010). Tracking china's health reform. *The Lancet*, 375(9720), 1056-1058.
- Gutsan, E., Patton, J., Willis, W. K., & PH, C. D. (2018, April 18-20). *Burnout syndrome and nurse-to-patient ratio in the workplace*. 54th Annual MBAA Conference, Chicago.
- Hansen, M. T. (2018). *Great at work: How top performers do less, work better, and achieve more*. Simon and Schuster.
- Härkänen, M., Vehviläinen - Julkunen, K., Murrells, T., Paananen, J., Franklin, B. D., & Rafferty, A. M. (2019). The contribution of staffing to medication administration errors: A text mining analysis of incident report data. *Journal of Nursing Scholarship*, 52(1), 113-123.
- Harris, C., Cortvriend, P., & Hyde, P. (2007). Human resource management and performance in healthcare organisations. *Journal of Health Organization and Management*, 21(4/5), 448-459.
- Headworth, A. (2015). *Social media recruitment: How to successfully integrate social media into recruitment strategy*. Kogan Page Publishers.
- Hecker, K., & Norman, G. (2017). Have admissions committees considered all the evidence? *Advances in Health Sciences Education*, 22(2), 573-576.
- Heinrich, J. (2001). Nursing workforce: Emerging nurse shortages due to multiple factors. Report to the chairman, subcommittee on health, committee on ways and means, house of representatives.
- Helfrich, C. D., Simonetti, J. A., Clinton, W. L., Wood, G. B., Taylor, L., Schectman, G., Stark, R., Rubenstein, L. V., Fihn, S. D., & Nelson, K. M. (2017). The association of team-specific workload and staffing with odds of burnout among va primary care team members. *Journal of General Internal Medicine*, 32(7), 760-766.
- Holland, P., & Collins, A. M. (2022). Supporting and retaining employees with rheumatoid arthritis: The importance of workplace social support. *The International Journal of Human Resource Management*, 33(3), 539-560.
- Homans, G. C. (1958). Social behavior as exchange. *American Journal of Sociology*, 63(6), 597-606.
- Hudson, C. K., & Shen, W. (2018). Consequences of work group manpower and expertise understaffing: A multilevel approach. *Journal of Occupational Health Psychology*, 23(1), 85-98.
- Hui, J., Wenqin, Y., & Yan, G. (2012). Family-paid caregivers in hospital health care in china. *Journal of Nursing Management*, 21(8), 1026-1033.
- Jankelová, N. (2021). The key role of strategically and people-oriented hrm in hospitals in slovakia in the context of their organizational performance. *Healthcare*, 9(3), 255.
- Jesson, J., Matheson, L., & Lacey, F. M. (2011). Doing your literature review: Traditional and systematic techniques.
- Jiang, K., Takeuchi, R., & Lepak, D. P. (2013). Where do we go from here? New perspectives on the black box in strategic human resource management research. *Journal of Management Studies*, 50(8), 1448-1480.
- Jiang, S., & Zhu, C. (2014, October 9). *Study on the supply and demand balance of enterprise human resources based on statistical prediction and analysis*. 2014 International Conference on Information Technology and Career Education, Hong Kong, China.
- Jimenez-Andrade, J., & Fogarty, T. (2019). Skin in the game? Experimental reactions to prospective reputational damage by corporate personnel. *Corporate Governance and Sustainability Review*, 3(2), 54-63.

- Jordan-Evans, S., & Kaye, B. (2002). Retaining employees. *Bloomsbury, Business: The Complete Guide, London: Bloomsbury*, 196-197.
- Judge, T. A., Zhang, S., & Glerum, D. R. (2020). Job satisfaction. In V. I. Sessa & N. A. Bowling (Eds.), *Essentials of Job Attitudes and Other Workplace Psychological Constructs* (pp. 207-241). Routledge.
- Jungerwirth, R., Wheeler, S. B., & Paul, J. E. (2013). Association of hospitalist presence and hospital-level outcome measures among medicare patients. *Journal of Hospital Medicine*, 9(1), 1-6.
- Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of Management Journal*, 33(4), 692-724.
- Kahn, W. A. (1992). To be fully there: Psychological presence at work. *Human Relations*, 45(4), 321-349.
- Karam, S., Nagahi, M., Dayarathna, V. L., Ma, J., Jaradat, R., & Hamilton, M. (2020). Integrating systems thinking skills with multi-criteria decision-making technology to recruit employee candidates. *Expert Systems with Applications*, 160, 113585.
- Kartal, N. (2018). Evaluating the relationship between work engagement, work alienation and work performance of healthcare professionals. *International Journal of Healthcare Management*, 11(3), 251-259.
- Kaye, B., & Jordan-Evans, S. (2001). Retaining key employees. *Public management*, 83(1), 6-11.
- Keller, S., & Meaney, M. (2017). Attracting and retaining the right talent. *McKinsey & Company*.
- Khatri, P., Gupta, S., Gulati, K., & Chauhan, S. (2010). Talent management in hr. *Journal of Management and Strategy*, 1(1), 39.
- Kim, C.-G., Kim, J.-S., & Bae, K.-S. (2023). Association between nurse staffing levels and rotavirus infection in neonatal intensive care units: A retrospective observational study. *Intensive and Critical Care Nursing*, 74, 103314.
- Kim, H. J., Shin, K. H., & Swanger, N. (2009). Burnout and engagement: A comparative analysis using the big five personality dimensions. *International Journal of Hospitality Management*, 28(1), 96-104.
- Knight, V., McKissick, B. R., & Saunders, A. (2013). A review of technology-based interventions to teach academic skills to students with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 43(11), 2628-2648.
- Knox, M. K., Mehta, P. D., Dorsey, L. E., Yang, C., & Petersen, L. A. (2022). A novel use of bar code medication administration data to assess nurse staffing and workload. *Applied Clinical Informatics*, 14(01), 076-090.
- Koch, T., Gerber, C., & De Klerk, J. J. (2018). The impact of social media on recruitment: Are you linkedin? *SA Journal of Human Resource Management*, 16, 1-14.
- Koeber, C., Appelbaum, E., Bailey, T., Berg, P., & Kalleberg, A. L. (2001). Manufacturing advantage: Why high-performance work systems pay off. *Contemporary Sociology*, 30(3), 250.
- Koivunen, S., Olsson, T., Olshannikova, E., & Lindberg, A. (2019). Understanding decision-making in recruitment. *Proceedings of the ACM on Human-Computer Interaction*, 3(GROUP), 1-22.
- Le Deu, F., Parekh, R., Zhang, F., & Zhou, G. (2012). Healthcare in china: Entering uncharted waters. *McKinsey & Company*.
- Lee, A., Cheung, Y. S. L., Joynt, G. M., Leung, C. C. H., Wong, W.-T., & Gomersall, C. D. (2017). Are high nurse workload/staffing ratios associated with decreased survival in critically ill patients? A cohort study. *Annals of Intensive Care*, 7(1), 1-9.
- Lee, L. (2004). The current state of public health in china. *Annual Review of Public Health*,

- 25(1), 327-339.
- Li, H., Barsanti, S., & Bonini, A. (2012). Building china's municipal healthcare performance evaluation system: A tuscan perspective. *International Journal for Quality in Health Care*, 24(4), 403-410.
- Li, Y., Xu, D., Chen, W., Yu, L., & Wu, Z. (2022). Performance evaluation index system in public hospitals: The delphi technique in nursing. *The International Journal of Health Planning and Management*, 38(1), 204-213.
- Liang, Z., & Brown, C. (2008). The twenty-first century face of senior health executives. *Asia Pacific Journal of Health Management*, 3(2), 30-36.
- Lin, Y. F., & Kleiner, B. H. (1999). How to hire employees effectively. *Management Research News*, 22(9), 18-25.
- Lown, B. A., Shin, A., & Jones, R. N. (2019). Can organizational leaders sustain compassionate, patient-centered care and mitigate burnout? *Journal of Healthcare Management*, 64(6), 398-412.
- Makarem, S. C., & Al-Amin, M. (2014). Beyond the service process. *Journal of Service Research*, 17(4), 399-414.
- Malakh-Pines, A., Aronson, E., & Kafry, D. (1981). *Burnout: From tedium to personal growth*. New york: free press.
- Maslach, C. (1993). Professional burnout: recent developments in theory and research. In Maslach, C. (Eds.), *Burnout: A multidimensional perspective*. (pp. 19–32). Taylor & Francis.
- Maslach, C., & Jackson, S. E. (1981). The measurement of experienced burnout. *Journal of Organizational Behavior*, 2(2), 99-113.
- Maslach, C., & Pines, A. (1977). The burn-out syndrome in the day care setting. *Child Care Quarterly*, 6(2), 100-113.
- Masoud, A. T., Zaazouee, M. S., Elsayed, S. M., Ragab, K. M., Kamal, E. M., Alnasser, Y. T., Assar, A., Nourelden, A. Z., Istatiah, L. J., Abd-Elgawad, M. M., Abdelsattar, A. T., Sofy, A. A., Hegazy, D. G., Femía, V. Z., Mendonça, A. R., Sayed, F. M., Elmoursi, A., Alareidi, A., Abd-Eltawab, A. K., . . . (2021). Kap-covid_{global}: A multinational survey of the levels and determinants of public knowledge, attitudes and practices towards covid-19. *BMJ Open*, 11(2), e043971.
- Maya, C. M., & Simões, A. L. (2011). Implicações do dimensionamento do pessoal de enfermagem no desempenho das competências do profissional enfermeiro. *Revista Brasileira de Enfermagem*, 64(5), 898-904.
- McConnell, C. R. (2003). The manager's approach to employee performance problems. *The Health Care Manager*, 22(1), 63-69.
- McHugh, M. D., Aiken, L. H., Sloane, D. M., Windsor, C., Douglas, C., & Yates, P. (2021). Effects of nurse-to-patient ratio legislation on nurse staffing and patient mortality, readmissions, and length of stay: A prospective study in a panel of hospitals. *The Lancet*, 397(10288), 1905-1913.
- Meskó, B., Hetényi, G., & Györffy, Z. (2018). Will artificial intelligence solve the human resource crisis in healthcare? *BMC Health Services Research*, 18(1), 1-4.
- Modestino, A. S., Sugiyama, K., & Ladge, J. (2019). Careers in construction: An examination of the career narratives of young professionals and their emerging career self-concepts. *Journal of Vocational Behavior*, 115, 103306.
- Moore, B. (1970). The effect of length of stay on nursing workload. *International Journal of Nursing Studies*, 7(2), 81-89.
- Nahrgang, J. D., Morgeson, F. P., & Hofmann, D. A. (2011). Safety at work: A meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. *Journal of Applied Psychology*, 96(1), 71-94.
- Nahum-Shani, I., & Bamberger, P. A. (2011). Explaining the variable effects of social support

- on work-based stressor-strain relations: The role of perceived pattern of support exchange. *Organizational Behavior and Human Decision Processes*, 114(1), 49-63.
- Navajas-Romero, V., Ariza-Montes, A., & Hernández-Perlines, F. (2020). Analyzing the job demands-control-support model in work-life balance: A study among nurses in the european context. *International Journal of Environmental Research and Public Health*, 17(8), 2847.
- NEA, K. M. (2022). Chaos, teamwork, compassion, and leadership: Disasters and nursing's finest hours. *Pediatric Nursing*, 48(4), 205-196.
- Neupane, R. (2015). Effects of coaching and mentoring on employee performance in the uk hotel industry. *International Journal of Social Sciences and Management*, 2(2), 123-138.
- Neves, T. M. A., Parreira, P. M. S. D., Graveto, J. M. G. N., Freitas, M. J. B. d. S. d., & Rodrigues, V. J. L. (2020). Nurse managers' perceptions of nurse staffing and nursing care quality: A cross - sectional study. *Journal of Nursing Management*, 28(3), 625-633.
- Niati, D. R., Siregar, Z. M. E., & Prayoga, Y. (2021). The effect of training on work performance and career development: The role of motivation as intervening variable. *Budapest International Research and Critics Institute (BIRCI-Journal): Humanities and Social Sciences*, 4(2), 2385-2393.
- Nolan, J., & Frishling, N. (2020). Human rights due diligence and the (over) reliance on social auditing in supply chains. In S. Deva & D. Birchall (Eds.), *Research Handbook on Human Rights and Business* (pp. 108-129). Cheltenham: Edward Elgar Publishing.
- O'Boyle Jr, E., & Aguinis, H. (2012). The best and the rest: Revisiting the norm of normality of individual performance. *Personnel Psychology*, 65(1), 79-119.
- Okoroafor, S., Ahmat, A., Osubor, M., Nyoni, J., Bassey, J., & Alemu, W. (2022). Assessing the staffing needs for primary health care centers in cross river state, nigeria: A workload indicators of staffing needs study. *Human Resources for Health*, 19(1), 1-10.
- Opie, T., Dollard, M., Lenthall, S., Wakerman, J., Dunn, S., Knight, S., & MacLeod, M. (2010). Levels of occupational stress in the remote area nursing workforce. *Australian Journal of Rural Health*, 18(6), 235-241.
- Oshodi, T. O., Bruneau, B., Crockett, R., Kinchington, F., Nayar, S., & West, E. (2019). The nursing work environment and quality of care: Content analysis of comments made by registered nurses responding to the essentials of magnetism ii scale. *Nursing Open*, 6(3), 878-888.
- Ozcan, Y. A. (2008). *Health care benchmarking and performance evaluation*. Springer.
- Pahos, N., & Galanaki, E. (2019). *Staffing practices and employee performance: The role of age*. Evidence-based HRM: a global forum for empirical scholarship,
- Papastavrou, E., Andreou, P., & Efstathiou, G. (2013). Rationing of nursing care and nurse-patient outcomes: A systematic review of quantitative studies. *The International Journal of Health Planning and Management*, 29(1), 3-25.
- Park, S. (2018). Cutbacks revisited: The relationship between resources and performance. *Public Management Review*, 21(4), 515-536.
- Patterson, F., Prescott-Clements, L., Zibarras, L., Edwards, H., Kerrin, M., & Cousins, F. (2015). Recruiting for values in healthcare: A preliminary review of the evidence. *Advances in Health Sciences Education*, 21(4), 859-881.
- Peters, B. G. (1996). *La capacité des pouvoirs publics d'élaborer des politiques [fichier d'ordinateur]*. Centre canadien de gestion.
- Phua, J., Weng, L., Ling, L., Egi, M., Lim, C.-M., Divatia, J. V., Shrestha, B. R., Arabi, Y. M., Ng, J., Gomersall, C. D., Nishimura, M., Koh, Y., & Du, B. (2020). Intensive care management of coronavirus disease 2019 (covid-19): Challenges and recommendations. *The Lancet Respiratory Medicine*, 8(5), 506-517.
- Ployhart, R. E. (2006). Staffing in the 21st century: New challenges and strategic opportunities.

- Journal of Management*, 32(6), 868-897.
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903.
- Potočnik, K., Anderson, N. R., Born, M., Kleinmann, M., & Nikolaou, I. (2021). Paving the way for research in recruitment and selection: Recent developments, challenges and future opportunities. *European Journal of Work and Organizational Psychology*, 30(2), 159-174.
- Pouramin, P., Li, C. S., Busse, J. W., Sprague, S., Devereaux, P. J., Jagnoor, J., Ivers, R., & Bhandari, M. (2020). Delays in hospital admissions in patients with fractures across 18 low-income and middle-income countries (inormus): A prospective observational study. *Lancet Glob Health*, 8(5), e711-e720.
- Pulyaeva, V. N., Ivanova, I. A., Gibadullin, A. A., Rudakova, E. N., & Rudenko, L. G. (2020). Digital tools in corporate personnel training. *Journal of Physics: Conference Series*, 1691(1), 012167.
- Rafii, M., & Andri, S. (2015). The influence of employee recruitment and placement on employee performance on pt. Bank riaukepri pekanbaru. *Online Journal of Indonesia Faculty of Social and Political Sciences*, 2(1), 1-12.
- Rajamohan, S., Porock, D., & Chang, Y. P. (2019). Understanding the relationship between staff and job satisfaction, stress, turnover, and staff outcomes in the person - centered care nursing home arena. *Journal of Nursing Scholarship*, 51(5), 560-568.
- Rattrie, L. T. B., Kittler, M. G., & Paul, K. I. (2019). Culture, burnout, and engagement: A meta - analysis on national cultural values as moderators in jd - r theory. *Applied Psychology*, 69(1), 176-220.
- Roberts, C., Khanna, P., Rigby, L., Bartle, E., Llewellyn, A., Gustavs, J., Newton, L., Newcombe, J. P., Davies, M., Thistlethwaite, J., & Lynam, J. (2017). Utility of selection methods for specialist medical training: A beme (best evidence medical education) systematic review: Beme guide no. 45. *Medical Teacher*, 40(1), 3-19.
- Rook, H. (2022). The social mandate of nursing: A mandate unfulfilled. In H. Rook (Ed.), *Complexity and values in nurse education* (pp. 160-183). Routledge.
- Ryu, K., & Myung, R. (2005). Evaluation of mental workload with a combined measure based on physiological indices during a dual task of tracking and mental arithmetic. *International Journal of Industrial Ergonomics*, 35(11), 991-1009.
- S. Harvey, W. (2014). Winning the global talent war. *Journal of Chinese Human Resource Management*, 5(1), 62-74.
- Sangeetha, K. (2010). Effective recruitment: A framework. *IUP Journal of Business Strategy*, 7(1), 93-107.
- Sarmiento, R., Beale, J., & Knowles, G. (2007). Determinants of performance amongst shop - floor employees. *Management Research News*, 30(12), 915-927.
- Sathiya, N., Ruwaidha, R., Nusrath, F. S., Fathima, F., Gomathy, T., & Shailendra, H. K. (2016). Perceived stress levels and its sources among doctors and nurses working in a tertiary care teaching hospital, kancheepuram, tamil nadu. *National Journal of Community Medicine*, 7(07), 603-608.
- Scanlan, J. N., & Still, M. (2019). Relationships between burnout, turnover intention, job satisfaction, job demands and job resources for mental health personnel in an australian mental health service. *BMC Health Services Research*, 19(1), 1-11.
- Schaufeli, W. B. (2015). Engaging leadership in the job demands-resources model. *Career Development International*, 20(5), 446-463.
- Schaufeli, W. B., Martínez, I. M., Pinto, A. M., Salanova, M., & Bakker, A. B. (2002). Burnout and engagement in university students. *Journal of Cross-Cultural Psychology*, 33(5), 464-481.

- Schaufeli, W. B., Salanova, M., González-Romá, V., & Bakker, A. B. (2002). The measurement of engagement and burnout: A two sample confirmatory factor analytic approach. *Journal of Happiness studies*, 3(1), 71-92.
- Schmitt, N., Chan, D., & Chan, E. (1998). *Personnel selection: A theoretical approach*. Sage.
- Shantz, A., Alfes, K., & Whiley, L. (2016). Hrm in healthcare: The role of work engagement. *Personnel Review*, 45(2), 274-295.
- Shen, Y., Jian, W., Zhu, Q., Li, W., Shang, W., & Yao, L. (2020). Nurse staffing in large general hospitals in china: An observational study. *Human Resources for Health*, 18(1), 1-7.
- Sheridan, T. B., & Simpson, R. (1979). *Toward the definition and measurement of the mental workload of transport pilots*.
- Shi, Y., Li, P., Yu, X., Wang, H., & Niu, L. (2018). Evaluating doctor performance: Ordinal regression-based approach. *Journal of Medical Internet Research*, 20(7), e240.
- Simpson, K. R., Lyndon, A., & Ruhl, C. (2016). Consequences of inadequate staffing include missed care, potential failure to rescue, and job stress and dissatisfaction. *Journal of Obstetric, Gynecologic & Neonatal Nursing*, 45(4), 481-490.
- Slatten, L. A., Bendickson, J. S., Diamond, M., & McDowell, W. C. (2021). Staffing of small nonprofit organizations: A model for retaining employees. *Journal of Innovation & Knowledge*, 6(1), 50-57.
- Spector, A., Orrell, M., & Goyder, J. (2013). A systematic review of staff training interventions to reduce the behavioural and psychological symptoms of dementia. *Ageing Research Reviews*, 12(1), 354-364.
- Stoyanova, R. G., & Harizanova, S. N. (2016). Assessment of the personal losses suffered by correctional officers due to burnout syndrome. *The International Journal of Occupational and Environmental Medicine*, 7(1), 33-41.
- Sun, S., Xie, Z., Yu, K., Jiang, B., Zheng, S., & Pan, X. (2021). Covid-19 and healthcare system in china: Challenges and progression for a sustainable future. *Globalization and Health*, 17(1), 1-8.
- Sutanto, E. M., & Kurniawan, M. (2017). The impact of recruitment, employee retention and labor relations to employee performance on batik industry in solo city, indonesia. *International Journal of Business and Society*, 17(2), 375-390.
- Tadić, M., Bakker, A. B., & Oerlemans, W. G. M. (2014). Challenge versus hindrance job demands and well-being: A diary study on the moderating role of job resources. *Journal of Occupational and Organizational Psychology*, 88(4), 702-725.
- Takeuchi, R., Lepak, D. P., Wang, H., & Takeuchi, K. (2007). An empirical examination of the mechanisms mediating between high-performance work systems and the performance of japanese organizations. *Journal of Applied Psychology*, 92(4), 1069-1083.
- Tao, W., Zeng, Z., Dang, H., Lu, B., Chuong, L., Yue, D., Wen, J., Zhao, R., Li, W., & Kominski, G. F. (2020). Towards universal health coverage: Lessons from 10 years of healthcare reform in china. *BMJ Global Health*, 5(3), e002086.
- Thaddeus, S., & Maine, D. (1994). Too far to walk: Maternal mortality in context. *Social Science & Medicine*, 38(8), 1091-1110.
- Turner, L., Culliford, D., Ball, J., Kitson-Reynolds, E., & Griffiths, P. (2022). The association between midwifery staffing levels and the experiences of mothers on postnatal wards: Cross sectional analysis of routine data. *Women and Birth*, 35(6), e583-e589.
- Unruh, L. (2008). Nurse staffing and patient, nurse, and financial outcomes. *AJN, American Journal of Nursing*, 108(1), 62-71.
- Urbancová, H., & Vrabcová, P. (2020). Age management as a human resources management strategy with a focus on the primary sector of the czech republic. *Agricultural Economics (Zemědělská ekonomika)*, 66(6), 251-259.
- Van Bogaert, P., Peremans, L., Van Heusden, D., Verspuy, M., Kureckova, V., Van de Cruys, Z.,

- & Franck, E. (2017). Predictors of burnout, work engagement and nurse reported job outcomes and quality of care: A mixed method study. *BMC Nursing*, 16(1), 1-14.
- Van der Heijden, B., Brown Mahoney, C., & Xu, Y. (2019). Impact of job demands and resources on nurses' burnout and occupational turnover intention towards an age-moderated mediation model for the nursing profession. *International Journal of Environmental Research and Public Health*, 16(11), 2011.
- Van Dijk, H. G. (2008). The talent management approach to human resource management: Attracting and retaining the right people. *Journal of Public Administration*, 43(s1-1), 385-395.
- Van Zyl, E. S., Mathafena, R. B., & Ras, J. (2017). The development of a talent management framework for the private sector. *SA Journal of Human Resource Management*, 15(1), 1-19.
- Viswesvaran, C., & Ones, D. S. (2000). Perspectives on models of job performance. *International Journal of Selection and Assessment*, 8(4), 216-226.
- Wang, L., Wang, Z., Ma, Q., Fang, G., & Yang, J. (2019). The development and reform of public health in china from 1949 to 2019. *Globalization and Health*, 15(1), 1-21.
- Wang, L., Yan, L., Zhou, T., Guo, X., & Heim, G. R. (2020). Understanding physicians' online-offline behavior dynamics: An empirical study. *Information Systems Research*, 31(2), 537-555.
- Wang, S., & Liu, Y. (2015). Impact of professional nursing practice environment and psychological empowerment on nurses' work engagement: Test of structural equation modelling. *Journal of Nursing Management*, 23(3), 287-296.
- Wang, S., Xu, W., Cui, Z., & Shi, Q. (2019). 美国加利福尼亚州以价值为本的按绩效付费项目及其对我国全科医生绩效考核体系和激励机制的启示 [The enlightenment of value-based pay for performance program in california on improving the performance evaluation system and incentive mechanism of general practitioners in china]. *中国全科医学*, 22(13), 1522-1527.
- Wazed, S., & Ng, E. S. W. (2015). College recruiting using social media: How to increase applicant reach and reduce recruiting costs. *Strategic HR Review*, 14(4), 135-141.
- Wee, K. Z., & Lai, A. Y. (2021). Work engagement and patient quality of care: A meta-analysis and systematic review. *Medical Care Research and Review*, 79(3), 345-358.
- Weitzel, T., Eckhardt, A., & Laumer, S. (2009). A framework for recruiting it talent: Lessons from siemens. *MIS Quarterly Executive*, 8(4).
- Wen, J., Huang, S., & Teo, S. (2023). Effect of empowering leadership on work engagement via psychological empowerment: Moderation of cultural orientation. *Journal of Hospitality and Tourism Management*, 54, 88-97.
- West, M. A., Guthrie, J. P., Dawson, J. F., Borrill, C. S., & Carter, M. (2006). Reducing patient mortality in hospitals: The role of human resource management. *Journal of Organizational Behavior*, 27(7), 983-1002.
- Xia, L., Jiang, F., Rakofsky, J., Zhang, Y., Shi, Y., Zhang, K., Liu, T., Liu, Y., Liu, H., & Tang, Y.-l. (2021). Resources and workforce in top-tier psychiatric hospitals in china: A nationwide survey. *Frontiers in Psychiatry*, 12, 573333.
- Yang, X., Feng, Y., Meng, Y., & Qiu, Y. (2019). Career adaptability, work engagement, and employee well-being among chinese employees: The role of guanxi. *Frontiers in Psychology*, 10, 1029.
- Yasir, A., Abid, G., Afridi, J., Elahi, N. S., & Asif, M. F. (2021). Social media communication and behavioral intention of customers in hospitality industry: The mediating role of customer satisfaction. *International Journal of Entrepreneurship*, 25, 1-14.
- Yun, H., Jie, S., & Anli, J. (2010). Nursing shortage in china: State, causes, and strategy. *Nursing Outlook*, 58(3), 122-128.

- Yun, Z., Zhou, P., & Zhang, B. (2022). High-performance work systems, thriving at work, and job burnout among nurses in chinese public hospitals: The role of resilience at work. *Healthcare, 10*(10), 1935.
- Zhang, H., Ye, Z., Tang, L., Zou, P., Du, C., Shao, J., Wang, X., Chen, D., Qiao, G., & Mu, S. Y. (2020). Anxiety symptoms and burnout among chinese medical staff of intensive care unit: The moderating effect of social support. *BMC Psychiatry, 20*(1), 1-7.
- Zhang, L., Shen, S., Guo, Y., & Fang, Y. (2021). Forecasting future demand of nursing staff for the oldest-old in china by 2025 based on markov model. *International Journal of Health Policy and Management, 11*(8), 1533-1541.
- Zhang, M., Yang, R., Wang, W., Gillespie, J., Clarke, S., & Yan, F. (2015). Job satisfaction of urban community health workers after the 2009 healthcare reform in china: A systematic review. *International Journal for Quality in Health Care, 28*(1), 14-21.
- Zhang, M., Zhu, C. J., Dowling, P. J., & Bartram, T. (2013). Exploring the effects of high-performance work systems (hpws) on the work-related well-being of chinese hospital employees. *The International Journal of Human Resource Management, 24*(16), 3196-3212.
- Zheng, X., & Rodríguez-Monroy, C. (2015). The development of intelligent healthcare in china. *Telemedicine and e-Health, 21*(5), 443-448.
- Zhu, J., Rodgers, S., & Melia, K. M. (2014). A qualitative exploration of nurses leaving nursing practice in china. *Nursing Open, 2*(1), 3-13.
- Zhu, X. W., You, L. M., Zheng, J., Liu, K., Fang, J. B., Hou, S. X., Lu, M. M., Lv, A. L., Ma, W. G., Wang, H. H., Wu, Z. J., & Zhang, L. F. (2012). Nurse staffing levels make a difference on patient outcomes: A multisite study in chinese hospitals. *Journal of Nursing Scholarship, 44*(3), 266-273.

Webliography

IIMedia. (2021, April 30). *2021 全球与中国大健康产业运行大数据及决策分析报告*.
IIMedia. Retrieved December 30, 2022, from
<https://baijiahao.baidu.com/s?id=1698447533452464968&wfr=spider&for=pc>

[This page is deliberately left blank.]

Annex A: The Interview Scripts

For top managers,

1. What do you think are the core business indicators that measure the business development of our hospital? What are the relationships between the indicators and the overall hospital manpower establishment?
2. With the growth of core business indicators, what do you think is the changing trend of the staff number in each business and functional department in the next three years? Why is the trend?)
3. Do you think that the existing manpower allocation of each department can match the development strategy of the hospital? Can it play a supporting role for business? If not, which departments or functional responsibilities need more manpower strengthened and supplemented?
4. Do you think the current post settings of each business and functional section are reasonable? Is there any buck-passing between departments and positions? Is the manpower being fully utilized? What is the direction of optimization and adjustment?
5. Do you have any expectations and suggestions for the "three-determinations" project of the hospital? (Including the main guiding ideology and direction of staffing, the business units that need to be focused on (should be increased or decreased), the key aspects that need to be focused on in the work process of the project team, etc.)

For cadres or directors of both clinical and functional departments,

1. Please briefly introduce the main responsibilities of your department, the current status of your staff, the staff structure, and the job division among them.
2. Are the responsibilities of the department clear in its daily operation? Does it effectively support and serve your department? Are there any crossover or overlap of responsibilities with other departments?
3. What is your opinion about the current job saturation level of the department? What are the key influencing factors you suppose can affect the number of department personnel? (Does the responsibilities of the department changed? The number of staff in the first three years, how the number changed every year, the reason for the change?) For what

responsibility do you think the headcount should be increased?

4. Is there any relevant guidance document on the number of staffing in the department by the supervisory authority or the parent unit? What is the measured staffing level based on the document? If the headcount is increased according to the guidance document, what is the increased output of the department?
5. Are there differences in current staffing compared to hospitals of the same type and size? What are the reasons for the differences?
6. Please describe your department's posting situation.
7. What is the principle of consideration for the current departmental posting? Is there any crossover of responsibilities between positions? How efficient is the collaboration between posts? What is the matching degree between the job name and the core duties of the job?
8. How do you think the position can be adjusted and optimized in the future?
9. Do you have any other expectations or suggestions about this project?

Annex B: Study 2 Outputs

Run MATRIX procedure:

***** PROCESS Procedure for SPSS Version 4.0 *****

Written by Andrew F. Hayes, Ph.D. www.afhayes.com
Documentation available in Hayes (2022). www.guilford.com/p/hayes3

Model : 8
Y : Perfor2
X : QuantSta
M : WorkEng
W : QualSta

Covariates:
age OrgTen Gender2 Educ2

Sample
Size: 967

OUTCOME VARIABLE:

WorkEng

Model Summary

R	R-sq	MSE	F	df1	df2	p
.2070	.0429	.6083	6.1359	7.0000	959.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	4.2407	.2011	21.0911	.0000	3.8461	4.6353
QuantSta	-.0681	.0345	-1.9719	.0489	-.1359	-.0003
QualSta	-.0411	.0271	-1.5127	.1307	-.0943	.0122
Int_1	-.1405	.0379	-3.7080	.0002	-.2148	-.0661
age	.1643	.0427	3.8460	.0001	.0805	.2482
OrgTen	-.0218	.0051	-4.2476	.0000	-.0318	-.0117
Gender2	.0950	.0659	1.4424	.1495	-.0342	.2243
Educ2	-.0149	.0239	-.6247	.5323	-.0618	.0319

Product terms key:

Int_1 : QuantSta x QualSta

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0137	13.7493	1.0000	959.0000	.0002

Focal predict: QuantSta (X)
Mod var: QualSta (W)

Conditional effects of the focal predictor at values of the moderator(s):

QualSta	Effect	se	t	p	LLCI	ULCI
-.9412	.0641	.0379	1.6907	.0912	-.0103	.1385
.0000	-.0681	.0345	-1.9719	.0489	-.1359	-.0003
.9412	-.2003	.0591	-3.3904	.0007	-.3162	-.0844

Moderator value(s) defining Johnson-Neyman significance region(s):

Value	% below	% above
-1.0483	11.6856	88.3144

-.0030 55.0155 44.9845

Conditional effect of focal predictor at values of the moderator:

QualSta	Effect	se	t	p	LLCI	ULCI
-1.5456	.1490	.0542	2.7502	.0061	.0427	.2553
-1.3877	.1268	.0494	2.5660	.0104	.0298	.2238
-1.2298	.1046	.0450	2.3272	.0202	.0164	.1929
-1.0720	.0825	.0409	2.0164	.0440	.0022	.1627
-1.0483	.0791	.0403	1.9624	.0500	.0000	.1583
-.9141	.0603	.0373	1.6142	.1068	-.0130	.1336
-.7562	.0381	.0345	1.1053	.2693	-.0295	.1058
-.5983	.0159	.0325	.4907	.6238	-.0478	.0796
-.4404	-.0062	.0315	-.1985	.8427	-.0680	.0555
-.2825	-.0284	.0316	-.8993	.3687	-.0905	.0336
-.1246	-.0506	.0329	-1.5404	.1238	-.1151	.0139
-.0030	-.0677	.0345	-1.9624	.0500	-.1354	.0000
.0333	-.0728	.0351	-2.0747	.0383	-.1416	-.0039
.1912	-.0950	.0381	-2.4905	.0129	-.1698	-.0201
.3491	-.1171	.0418	-2.8014	.0052	-.1992	-.0351
.5070	-.1393	.0460	-3.0296	.0025	-.2296	-.0491
.6649	-.1615	.0505	-3.1966	.0014	-.2606	-.0624
.8228	-.1837	.0553	-3.3195	.0009	-.2923	-.0751
.9807	-.2058	.0604	-3.4108	.0007	-.3243	-.0874
1.1386	-.2280	.0655	-3.4795	.0005	-.3566	-.0994
1.2965	-.2502	.0708	-3.5319	.0004	-.3892	-.1112
1.4544	-.2724	.0763	-3.5722	.0004	-.4220	-.1227

Data for visualizing the conditional effect of the focal predictor:

Paste text below into a SPSS syntax window and execute to produce plot.

DATA LIST FREE/

QuantSta QualSta WorkEng .

BEGIN DATA.

```

-.8023      -.9412      4.4976
.0000      -.9412      4.5490
.8023      -.9412      4.6005
-.8023      .0000      4.5650
.0000      .0000      4.5104
.8023      .0000      4.4557
-.8023      .9412      4.6325
.0000      .9412      4.4718
.8023      .9412      4.3110

```

END DATA.

GRAPH/SCATTERPLOT=

QuantSta WITH WorkEng BY QualSta .

OUTCOME VARIABLE:

Perfor2

Model Summary

R	R-sq	MSE	F	df1	df2	p
.5653	.3196	.2931	56.2513	8.0000	958.0000	.0000

Model

	coeff	se	t	p	LLCI	ULCI
constant	1.5719	.1689	9.3084	.0000	1.2405	1.9033
QuantSta	-.0515	.0240	-2.1431	.0324	-.0986	-.0043
WorkEng	.4370	.0224	19.4975	.0000	.3931	.4810
QualSta	.0006	.0189	.0309	.9754	-.0364	.0376
Int_1	-.0940	.0265	-3.5501	.0004	-.1460	-.0420
age	-.0405	.0299	-1.3543	.1760	-.0991	.0182
OrgTen	.0030	.0036	.8321	.4056	-.0041	.0100
Gender2	.1489	.0458	3.2537	.0012	.0591	.2387
Educ2	-.0185	.0166	-1.1152	.2650	-.0510	.0140

Product terms key:

Int_1 : QuantSta x QualSta

Test(s) of X by M interaction:

	F	df1	df2	p
	5.6826	1.0000	957.0000	.0173

Test(s) of highest order unconditional interaction(s):

	R2-chng	F	df1	df2	p
X*W	.0090	12.6035	1.0000	958.0000	.0004

Focal predict: QuantSta (X)
Mod var: QualSta (W)

Conditional effects of the focal predictor at values of the moderator(s):

QualSta	Effect	se	t	p	LLCI	ULCI
-.9412	.0370	.0264	1.4041	.1606	-.0147	.0887
.0000	-.0515	.0240	-2.1431	.0324	-.0986	-.0043
.9412	-.1400	.0413	-3.3928	.0007	-.2209	-.0590

Moderator value(s) defining Johnson-Neyman significance region(s):

Value	% below	% above
-1.1823	11.6856	88.3144
-.0590	53.3609	46.6391

Conditional effect of focal predictor at values of the moderator:

QualSta	Effect	se	t	p	LLCI	ULCI
-1.5456	.0938	.0378	2.4854	.0131	.0197	.1679
-1.3877	.0790	.0344	2.2945	.0220	.0114	.1465
-1.2298	.0641	.0313	2.0493	.0407	.0027	.1256
-1.1823	.0597	.0304	1.9624	.0500	.0000	.1194
-1.0720	.0493	.0284	1.7329	.0834	-.0065	.1051
-.9141	.0345	.0260	1.3272	.1847	-.0165	.0854
-.7562	.0196	.0239	.8189	.4131	-.0274	.0666
-.5983	.0048	.0225	.2114	.8326	-.0395	.0490
-.4404	-.0101	.0218	-.4613	.6447	-.0530	.0328
-.2825	-.0249	.0220	-1.1354	.2565	-.0680	.0182
-.1246	-.0398	.0228	-1.7418	.0819	-.0846	.0050
-.0590	-.0459	.0234	-1.9624	.0500	-.0919	.0000
.0333	-.0546	.0244	-2.2377	.0255	-.1025	-.0067
.1912	-.0695	.0266	-2.6159	.0090	-.1216	-.0174
.3491	-.0843	.0291	-2.8927	.0039	-.1415	-.0271
.5070	-.0991	.0321	-3.0913	.0021	-.1621	-.0362
.6649	-.1140	.0353	-3.2334	.0013	-.1832	-.0448
.8228	-.1288	.0386	-3.3353	.0009	-.2046	-.0530
.9807	-.1437	.0421	-3.4091	.0007	-.2264	-.0610
1.1386	-.1585	.0458	-3.4630	.0006	-.2484	-.0687
1.2965	-.1734	.0495	-3.5029	.0005	-.2705	-.0762
1.4544	-.1882	.0533	-3.5326	.0004	-.2928	-.0837

Data for visualizing the conditional effect of the focal predictor:

Paste text below into a SPSS syntax window and execute to produce plot.

DATA LIST FREE/

QuantSta QualSta Perfor2 .
BEGIN DATA.

-.8023	-.9412	3.6920
.0000	-.9412	3.7216
.8023	-.9412	3.7513
-.8023	.0000	3.7635
.0000	.0000	3.7222
.8023	.0000	3.6809
-.8023	.9412	3.8350
.0000	.9412	3.7227
.8023	.9412	3.6104

END DATA.

GRAPH/SCATTERPLOT=

QuantSta WITH Perfor2 BY QualSta .

***** DIRECT AND INDIRECT EFFECTS OF X ON Y *****

Conditional direct effect(s) of X on Y:

QualSta	Effect	se	t	p	LLCI	ULCI
-.9412	.0370	.0264	1.4041	.1606	-.0147	.0887
.0000	-.0515	.0240	-2.1431	.0324	-.0986	-.0043
.9412	-.1400	.0413	-3.3928	.0007	-.2209	-.0590

Conditional indirect effects of X on Y:

INDIRECT EFFECT:

QuantSta -> WorkEng -> Perfor2

QualSta	Effect	BootSE	BootLLCI	BootULCI
-.9412	.0280	.0173	-.0052	.0622
.0000	-.0298	.0155	-.0605	.0001
.9412	-.0875	.0261	-.1396	-.0372

Index of moderated mediation:

QualSta	Index	BootSE	BootLLCI	BootULCI
	-.0614	.0168	-.0955	-.0293

***** ANALYSIS NOTES AND ERRORS *****

Level of confidence for all confidence intervals in output:

95.0000

Number of bootstrap samples for percentile bootstrap confidence intervals:

5000

W values in conditional tables are the mean and +/- SD from the mean.

NOTE: The following variables were mean centered prior to analysis:

QualSta QuantSta

NOTE: Standardized coefficients not available for models with moderators.

----- END MATRIX -----

Annex C: Departmental Levels

No.	First-level department	Second-level department	Third-level department	Fourth-level department
1	Administrative office	Hospital History Office (Hospital Chronicle compilation Office)	Drivers crew Switchboard room	
2	Publicity dept			
2	Party Committee Office	Youth League committee		
3	Discipline inspection and Supervision Office			
4	Personal depts	Archives room Retirement Management Office		
5	Finance Section	Performance office	Hongli tollhouse Fuqiang tollhouse	
6	Medical department	Medical Dispute Prevention Office		
7	Nursing department	Convenient Service Center Supply room	Internet+Nursing Services	
8	Science and Education dept	Office of Standardized Training for Residents "Sanming" project Office Simulation Training Office Office of Medical Device Clinical Trial Institution Management Office of the Postdoctoral Innovation Practice Base Office of standardized training for specialists		
9	Price and medical insurance management dept			

		The security department	
		Construction office	
			Maintain group
			Clothing group
10	Logistics Management dept		Dining hall
			property management (Hongli)
			property management (Fuqiang)
11	Medical Equipment Management dept		Medical equipment maintenance Group
12	Medical Quality Control dept		
13	Office of Internal dept		
		Computer Network Office	
14	Information management dept		Library
			Statistical office
15	Internet Hospital Office		
16	Prevention and health care dept		
17	Bidding and Purchasing Office		
19	Hospital Infection Management dept		
20	Third rate level management Office		
21	Relocation office		
22	Ethics Committee office		
23	Institute of Maternal and Child Medicine(Clinical Program Office)		
24	Institute of Maternal and Child Medicine(Health Program Office)		
25	Medical Record Management Division		
26	Ministry of maternal health care		
27	Ministry of women's health care		
28	Ministry of child health care		
29	Ministry of family planning technical services		
		Project Management Office of Medical and Prevention Integration	
30	Health care office		
31	Health Education dept		
32	Maternal and child Information Management dept		

33	Women's health care dept			
34	Women's Health Centre			
35	Child health care dept			
36	Child health care clinic	Hearing diagnostic Center		
37	Child psychology and rehabilitation dept	Pediatric Neurorehabilitation department		
		Child psychology department		
38	Eye Health Care dept		Hongli Eye Health Care dept	
			Fuqiang Eye Health Care dept	
39	Neonatal Disease Screening Center			
40	Oral health dept			
		Obstetrical first zone		
		Obstetrical second zone		
		Obstetrical third zone		
		Obstetrical fifth zone		
		Obstetrical sixth zone		
41	Obstetrical department	Obstetric ICU		
		Obstetrical eighth zone		
		Delivery room		
		The maternity clinic	Hongli maternity clinic	Build copies of outpatient service
			Fuqiang maternity clinic	
		Maternal-fetal Medicine Center		
		Gynecology first zone		
		Gynecology third zone		
42	HongLi Gynecology department	Gynecology fifth zone		
		HongLi Gynecology Outpatient	The cervical outpatient	
43	Cervical Cancer Early Diagnosis and treatment center	FuQiang Gynecology ward		
		FuQiang Gynecology Outpatient	Gynecology Outpatient	Gynecological outpatient surgery unit
44	FuQiang Gynecology department	FuQiang cervical outpatient		
		Focused ultrasound ablation center		
		Hysteroscopy Minimally Invasive Center		
45	Neonatology department	Neonatology first zone		
		Neonatology NICU		

		Neonatology third zone	
		Neonatology fifth zone	
		Pediatric first zone	
		Pediatric PICU	
46	Pediatric department	Hongli Pediatric Outpatient	
		Fuqiang Pediatric Outpatient	
		Pediatric surgery	
		Galactophore ward	
47	Galactophore department	Galactophore outpatient	Hongli Galactophore outpatient Fuqiang Galactophore outpatient
		TCM ward	
48	TCM department	Hongli TCM outpatient	
		Fuqiang TCM outpatient	
49	Chinese acupuncture		Hongli Acupuncture outpatient Fuqiang Acupuncture outpatient
50	Center for Reproductive Medicine		
51	General Department of Reproductive Immunology		
			Injection room
			Treatment room
		Hongli Emergency	Resuscitation room
52	Emergency department		Fever clinic
		Fuqiang Emergency	Resuscitation room
		Emergency observation area	
		Hongli Anesthesia department	
53	Anesthesia department(operating theater)	Fuqiang Anesthesia department	
			Hospital registration
			Otolaryngology clinic
54	The first outpatient department		Special need clinic
			Treatment room
			Injection room
			Bloodletting room
			Hospital registration
			Breastfeeding counseling clinic
55	Second outpatient department		Otolaryngology clinic
			Ophthalmology clinic
			Dental clinic
			Special need clinic

		Electrocardiogram room
		Nutrition clinic
56	Physician department	Hongli Physician outpatient Fuqiang Physician outpatient
57	Dermatology department	Hongli Dermatology outpatient Fuqiang Dermatology outpatient
58	Physical examination department	
		Hongli pharmacy
		Fuqiang pharmacy
		Hongli central pharmacy
		Fuqiang central pharmacy
		Hongli TMC pharmacy
59	Pharmacy department	Fuqiang TMC pharmacy
		Infusion pharmacy
		Drug Storage
		Clinical pharmacy
		Fever pharmacy
		Intravenous drug dispensing center
	Blood transfusion department	
60	Laboratory department	Hongli Clinical lab Fuqiang Clinical lab
61	Pathology department	Hongli Pathology Fuqiang Pathology
62	Ultrasound department	Hongli Ultrasound department Fuqiang Ultrasound department
63	Radiology department	Hongli Radiology department Fuqiang Radiology department
64	Prenatal diagnostic center	
65	Medical Genetics Centre	
66	Infectious diseases department	
67	Institute of Maternal and Child Medicine Laboratory	
68	Health care Project Office Municipal Infant Care Service Guidance Center	