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Abstract
Background: The World Health Organization (WHO) proposed a global strategy to build a robust Health Research System Resources and Infrastructural Capacity (HRSRIC). Despite the growing research productivity, HRSRIC in Palestine has rarely been investigated.

Aims: This study aims to analyse perceptions of health research system performers in order to understand the status of HRSRIC, to identify its gaps, and to propose policy solutions to strengthen the HRSRIC.

Methods: This qualitative study targeted three health sectors, government, academia, and local and international organizations. Fifty-two in-depth interviews (IDIs) and 6 focus group discussions (FGDs) were conducted with key-informants who were selected purposively. Data were analysed by using MAXQDA 12.

Results: Despite the availability of competent personnel, the overall HRSRIC such as human and financial resources, and facilities form a central challenge. Health research (HR) financing is limited, unsustainable, and flows from external and individual sources. The public and private funds are largely in shortage with resources misallocation and donors’ conditionality. HR quality is moderate while knowledge transfer and translation are not well-conceptualized and inappropriately performed. Lack of governance, coordination, HRSRIC strategy, resource allocation, systematic and reliable data, evidence-informed culture, and environmental impacts are the main common gaps.

Conclusions: The overall status of HRSRIC in Palestine is still lacking and major challenges persist where the pace of strengthening efforts is steady. There is an emphasis that strengthening HRSRIC is an imperative step and real investment opportunity for building a successful HRS. Political commitment, consolidated leadership structure, operational capacity building-strengthening strategy, and resources mobilization and sovereignty are key requirements.

Keywords: health research system, capacity and resources, Palestine, health systems, health resources
Introduction

Health Research System Resources and Infrastructure Capacity (HRSRIC) is recognized as a central functional pillar of HRS. Strengthening of the HRSRIC contributes to addressing global health challenges and improving health outcomes in low-and-middle-income countries (LMICs). HRSRIC is a complex and context-sensitive issue that requires a combination of different analysis approaches applied at individual, institutional, and societal levels (1). Therefore, HRSRIC concept consists of two components: 1) creating and sustaining human and physical resources and infrastructural capacity; and 2) securing research funds. Both components are necessary to conduct, absorb, and utilize Health Research (HR). This is certainly emphasized by the World Health Organization (WHO), which urges that mobilizing and sustaining the sufficient resources and required potentials (2) are important to generate high-quality knowledge to support evidence-informed decision-making (3). HRSRIC should be considered in any attempt to analyse the HRS, and this is clearly and fundamentally featured in conceptual HRS frameworks that help in better system understanding through a wide-range analysis approach (4–6), as other similar studies found (7–9). These frameworks portrayed the HRS fabric, including HRSRIC, which forms a solid base and an imperative priority for any HR advancement. Therefore, this justifies the attempt to examines HRSRIC in this paper.

Mobilizing and equipping HRS with all resources is an ongoing process of empowering individuals, organizations, and nations, and therefore WHO, Council on Health Research for Development (COHRED), the Global Forum on HR and other agencies such as the World Bank explicitly and unanimously underlined the HR capacities (10,11). However, numerous studies globally revealed that there is an unequal distribution of resources for higher education and research in the world. Moreover, many LMICs have difficulties in building up their HR capacity to support effective national HRSs for better decision making (12,13). Some of these difficulties are: lack of qualified human resources and researchers, lack of research funding, and lack of infrastructural capacity (14). To conclude, unfortunately, HRSRIC remains one of the world's unmet challenges in managing HRS (15–17) where the allocation is less than 0.5% of national
health budgets for HR (18) in the context of 10/90 gap (19).

In response to this situation, HR Capacity Strengthening (HRCS) strategy has been recently implemented worldwide to improve the ability of these countries to tackle the persistent and disproportionate burdens of disease they face. The strategy has gained a substantial investment from donors; hence, they are increasingly interested in evaluating the benefits of their investments in HR (2). Embracing the HRCS scope in this paper is a realistic guide with the adopted frameworks. The terms “capacity strengthening” and “capacity building” are often used interchangeably; the first refers to establishing a research infrastructure, while the second precisely denotes to enhancing a pre-existing infrastructure (20).

Regionally, HR across the Middle East and North Africa region faces critical deficits, most notably are governance, resources, and capacity of the knowledge production and application (4,21). Similar deficits exist in Palestine with insufficient understandings and conceptualizations about the reality of HR potentials. In fact, in Palestine (externally-aids dependent country), donors play an inadequate role in supporting the capacity of research institutions (22–24). This necessitates assessing and understanding local resources and international aid allocated towards HR capacity to ensure the effective utilization of available funds (25). Therefore, addressing the before-mentioned critical challenges and knowledge gap was one of the driving factors to conduct this study. Furthermore, this is the first study to examine HRSRIC. The study is crucial and it seeks to depict a clear and comprehensive picture towards assisting the policy-makers in building a well-infrastructure, resourced, and capacitated national HRS in a state under creation like Palestine.

It significantly features in this study that any decision, strategy, or action to strengthen or build HRSRIC is a significant investment endeavour to advance not only health but also other development sectors. In addition, this study is part of a larger research project that investigated other components of the Palestinian HRS and it is also consistent with WHO’s strategic directions on HR and it could also be a reference at the regional level with respect to HRSRIC advancement. The overall aim is to understand HRSRIC constituents to inform the health policy-makers with evidence and insights towards resourceful and enabled-HRS. To achieve the overall aim, this study tries to assess the actual status, gaps and shortfalls, and to identify opportunities of improvement, allocation, and optimization of resources and capacity components of the HRS in Palestine.

**Methods**

This study is part of a comprehensive system analysis. The design, methods, and instruments used were typically similar to relevant local studies that dealt with other components of HRS
and carried out in Palestine. Identical participants (104 key-informants) were purposively selected from three sectors in the health field. Perceptions of participants from three sectors in Palestine – the government, academia, and local and international Non-governmental organizations (NGOs) – were investigated. The approaches of collecting, managing, and analysing data through conducting 52 in-depth interviews (IDIs) and 6 focus group discussions (FGDs) were also typically adopted and used in previous similar studies in Palestine (7–9).

Results

The overall responses were obtained from 104 experts who are involved in HRS and aware of the system resources and capacity. The responses covered the findings in three key areas. Apart from the socio-demographic characteristics of the participants that were previously presented in other relevant published (7–9) and in press studies, two other areas were as follows: 1) the overall existing situation, limiting, and facilitating factors of human resources, infrastructure, and facilities of the HRS; and 2) The scene of HRS financing, sources, gaps, and best solutions for optimization. HRS human resources and infrastructure and HR financing are the main two findings that the current study focuses on.

HRS human resources and infrastructural capacity (HRSRIC) in Palestine

Table 1 presents the findings on the HRS human resources and infrastructural capacity (HRSRIC), where these findings are classified into three themes: 1) The overall landscape of the HRSRIC; 2) Obstacles related to HRSRIC; and 3) Perceptions to improve the resources and capacity. For the first theme, experts described the status of the HRS human resources and infrastructure as generally experiencing a noticeable shortage. However, some experts pointed to plenty of qualified human resources, particularly in academia, but highlighted the fact that these are untapped and, as many experts alleged, not adequately trained. Various academics remarkably revealed that the Ministry of Health (MoH) chronically faces a scarcity of essential medical supplies, academia sharply suffers from financial crises, and the lack of most resources is due to the absolute control and restrictions imposed by the occupation.

All responses about HR resources themed into two description categories, the first category is the most frequent and represents the vast majority. The descriptive remarks ranged from “severe lack”, “very weak”, “limited”, “scarce”, and “inadequate”. While the other responses, which formed the minority were comprised: “resources exist”, “good”, and “good but unsophisticated and insufficient”. Participating in FGDs, academics referred to the poor performance of HR to weak potentials. They admitted to the availability of resources and good capacity, but managing HRSRIC is said to be a central difficulty. Government experts recognized the lack of research budgets where they called for a 5% of the central health budget to be allocated to HR. Conversely, NGOs experts alleged that the national health plan 2011-2013 allocated 1% to HR, but other experts argued that this is unreal.
The second theme reflects on the main obstacles facing the HRSRIC being mainly correlated with the absence of a regulatory framework. Mismanagement of resources, a weak strategic leadership, duplication and individuality in HR efforts, brain drain, and insufficient experience and skills of the current human resource were common hurdles reported by experts. Others pointed to other factors such as lack of sustainable and national funds, political turmoil, time constraints, and lack of investment plans in infrastructure innovation and technological development in all sectors. The third theme presents perceptions to tackle these hurdles; the majority agreed on the centrality of having the political support to initiate a strategic dialogue to build a national HR body. Participants recommended that this body should be in charge of framing a development strategy and policy with emphasis on: 1) securing adequate and fixed budgets, stimulate the local support and invest donor funds appropriately to strengthen HR infrastructure; 2) advancing the capacities of strategic planning and optimal resources management; 3) fostering partnerships, fellowships, exchange programmes, learning institution approach and capacity building programmes, whether at the local or international level, to evolve the institutional and national HR resources and capacities; and lastly; and 4) enriching approaches to research prioritization exercises, integration, intra-inter-trans-disciplinarity and networking for better resources and capacity identification, allocation and utilization.

**HR financing**

Table 2 shows the findings on the status of HR financing (HRF), which comprises four themes: 1) the status of funding; 2) funding sources; 3) gaps; and (4) the steps needed to improve HRF. Concerning HRF status, the findings show an overwhelming consensus on extreme fund deficiency directed to HR. The majority of experts harmoniously echoed that the hands of the Palestinian government and institutions are tied in spending to HR. This was evidently emphasized through their reflections that "no specific HR budget and allocation", “HRF is insufficient, scattered, unsustainable, and project-based”, “HR is not a priority and underinvestment”, “external, conditioned”, and “a major challenge”. With regard to the sources of this fund, the experts overwhelmingly agreed on the two main sources of HRF, the first and mainly from external resources and donations through international organizations, and the second source is an individual resource, which means that researchers are financing their research at their personal expense.

The most important gaps that hinder appropriate and sustainable HRF were focused on three dimensions. The first associated with the low official interest in HR, the absence of regulatory frameworks, financing, and investment strategies, and also that less important sectors such as security were allocated greater funding. The second is notably related to bureaucratic procedures for financing and the conditions of the donors. The third dimension is the scarcity of national resources and political conditions. For better HRF, promoting the importance of HR and to develop national HR agendas, to identify and guide resources appropriately, is essential.
In summary, the findings indicate that a political commitment is essential to ensure sustainable financial resources for HR through possibly different channels, where the majority proposed solutions to tackle the financial scarcity of HR, such as: 1) Establishing a national fund under the MOH-PNIPH joint patronage with proper resources allocation and management, and 2) stimulating domestic financing and optimizing international funding on the basis of a long-term strategic partnership to ensure the pillars of HRS are firmly in place.

**Discussion**

This study dealt with the most two important pillars of the HRS (3), exploring the system resources and infrastructural capacity. As HRS is a complex and diverse context (26,27) and under growing attention (2,28,29), the findings of this system analysis are expected to offer a worthwhile contribution to the understanding of both components in order to move forward towards a successful HRS based on national HRS capacity strengthening strategy. To address the weakness of HRSRIC and HR financing, this strategy, as a futuristic move, should be politically adopted, a matter of consensus, and backed by international actors, to ensure a well-resourceful and capacitated HRS.

Generally, skilled human resources in Palestine are increasing in spite of the institutional challenges. Other literature indicated the contrasting evidence that research personnel is limited with a lack of qualified experts (30), where the distribution of these resources is challenging as they are concentrated within academia and government. In addition, the competencies and freedom of movement of those personnel need to be improved, especially for those from the Gaza Strip. The Palestinian researchers in full-time equivalents are nearly 2000, equivalent to 564.1 researchers per one million inhabitants (31). The teaching faculty make up 44% of the workers in the Palestinian higher education institutions; this ratio is not in harmony with the international standards (two thirds for teaching and the rest as administration and services). Compared to that in the region, Egypt has almost 600 researchers, while Jordan is the highest with around 1900 (4). Overall, the number of researchers from the Eastern Mediterranean Region is relatively low (ranging from 29 to 1927 per million people) (32). However, the workforce can be seen as promising and improving compared with other HRSRIC components such as infrastructure, facilities, and funding, where these components remain structurally and functionally weak not only in the HRS but also in the HCS alike and strengthening them is often neglected (18,33,34).

Due to state fragility, national institutions – mainly government and academic – face severe financial crises, which negatively affect performance (35). This scene not only hampers any HR development effort but also threatens the continuity of public services, particularly education and health. Furthermore and as another study revealed, in view of capacity gaps, building a
robust HRS will be unattainable as long as we lack a governing framework, strategic thinking in resources and capacity allocation, and sustainable investment for HR (4,21,33). In recent years, a growing number of projects have supported the Palestinian HR capacity through international and local parties, for instance, European Union–Horizon 2020, academic partnerships, UN agencies, the Islamic Development Bank, governments (such as Palestinian-French joint committee, the Palestinian–German Science Bridge, Palestine-Quebec Science Bridge, the Norwegian Institute of Public Health through Norway’s Minister of Foreign Affairs, and others), Qatar Charity, Welfare Association, and local private sector (including banks, pharmaceuticals companies, and businessmen). To gain a greater impact, such initiatives, projects and interventions are required to be structured, strategic, and focused within the inclusive national framework and they ought to follow a long-term development vision.

Brain drain forms another intractable challenge in Palestine (30) due to a lack of incentives and discouraging environments. This issue is the focus of the international debate in HR area (2) and also regionally, Arab states lose 50% of their newly qualified physicians and 15% of their scientists annually (4). Therefore, building or strengthening HRRC effort is a truly urgent priority. The effort of retaining and bringing back the intellectual capital and skilled human resources to the country, and training and educating the current health workforce should be applied at the individual and institutional levels as part of a comprehensive developmental move. To attain this target, three approaches could be followed: 1) HRCS strategy (20); 2) HRS operational and functional framework (2); and 3) ESSENCE seven basics for strengthening HR capacity (25).

Also, as it is one system, its pillars affecting each other, applying these approaches in tackling the following three components; HR production and quality, HR transfer, and HR translation is also essential, in order to move synergistically to the empowering of the HRSRIC. These three operational components related to HRSRIC must be fundamentally embedded and well-functioning in any HRS (2).

The overall HRF is persistently scarce, as other comparable (7–9) and different studies have affirmed (36–38). However, limited and volatile individual and institutional financing efforts (38) could have an impact if structured and brought into a collective framework. Certainly, as a relevant study proved (7–9), HR is still not high on the government priorities list due to many conflicting concerns. Different factors behind the lack of HRF, which harmonized with some studies, are: 1) HR and evidence-based concepts are not well-entrenched among decision-makers (39,40); and 2) weakness of advocacy and pressure campaigns to initiate a serious movement towards strengthening the HRS. Even with the donors’ limited role, the Palestinian HR primarily depends on the unsystematic external and individual funding with a clear lack of public domestic funding.

In contrast, another study revealed that public investment is the main source in the region’s countries and HR funding is among the lowest globally and WHO Regional Office for the
eastern Mediterranean is a key body offering HRF (4). There are other funding gaps concerning the donors’ conditions, influence and procedural difficulty (39,41) and the scarcity of national resources due to the political conditions. For sustainable HRF, HR should receive the commitment of a fixed budget, at least 1% of the national health expenditure (2), along with a national integrated and pooled fund under government stewardship financed by Palestinian and non-Palestinian entities’ contributions (4,18).

It is worth mentioning that the study takes into account the impact of the current reality on the development of HRSRIC. It is important to shed light on the role and impact of the political situation on HR in relation to limiting or facilitating the strengthening efforts of human and financial resources and infrastructural potentials. In Palestine, as an exceptional case, there are two pathways to understanding the current political scene; first, the continuation of the Israeli occupation undermines any national development efforts by restricting the movement of individuals, supplies, goods, and materials, properties demolition, raids, and seizing land and natural resources. Second, the consequences of the ongoing intra-Palestinian political division among major political factions in the Gaza Strip and the West Bank. These consequences are the multiplicity of administrations, mistrust, conflicting visions, duplication of agendas, a deficit of budgets, disturbances throughout the public sector such as salaries reduction, overstaffing with low productivity, compulsory collective retirement. Therefore, addressing these two factors, as part of the efforts to advance the HRS in general, and the HR resources and infrastructure in particular, is important and inevitable. Accordingly, the Palestinians, with a considerable role of the international institutions, are invited to a national workshop that seriously examines the opportunities of eliminating these obstacles and leads to launching efforts to enable and strengthen the resources and facilities of HRS in Palestine.

The study proposes some prospects that could not be addressed but could become research ideas in the future. Among the most important of these ideas, initially considered also at the outset, is a sectorial and more empirical national HR capacity assessment may be useful in determining precisely HRSRIC such as assets, resources, and facilities at the institutional, sectoral, and national levels. Such assessment deserves to be implemented using qualitative and quantitative measurements. Once the HRS is structured, national comprehensive system analysis is required to investigate inputs, processes, and outputs dimensions.

**Limitations**

The study has a number of limitations as follows: knowledge gap of relevant local and regional literature and reports on the subject; time constraint in mapping the definite existing capacities across the sectors, as well as in targeting more participants and targeting of additional relevant institutions; difficulties related to gathering quantitative data on HR stakeholders and capacities in Palestine due to lack of data availability, quality, organization, and accessibility; field restrictions on the freedom of movement of the research team as a result of the closure and
security checkpoints; and environmental and political fluctuations and institutional changes that may escalate or reduce the role of the stakeholders on the one hand and funding flow to the health sector in general, and to HR activities in particular on the other hand.

**Conclusion**

This system analysis is important not only to Palestine but also to other countries in the region in order to guide the HRSRIC strengthening and advancement endeavors meaningfully. The overall status of HRSRIC in Palestine is insufficient/weak and major challenges persist where the pace of strengthening efforts is steady. Inadequate HR capacity for infrastructure, facilities, supplies, and logistics is not addressed strategically. This applies to dozens of projects that are dedicated to expanding and boosting HRSRIC, but have not been implemented through a national strategic approach. This scarcity of resources and loss of capacities is affected politically by perpetuating factors – the Israeli occupation, and the intra-Palestinians division. A strategy for HRSRIC is crucially required and can be adopted to improve the ability of the Palestinian government. Interestingly, human resources are considered a promising side in HR compared with some other countries in the region. Thus, there is a necessity for investment in empowering the knowledge and competencies on HR subjects, enhancing an effective incentive system, and providing the required health facilities with a supportive environment to face the rising brain drain. Furthermore, the Palestinians loss of control over their resources and politicized foreign aids are also contributing to the scarcity of resources and the organic association of progress.

In spite of the scarcity in the region, HR Funding in Palestine is often funded by external donors and individual and institutional sources. This funding is still extremely scarce, with a considerable lack of government funding. The HR in the successive budgets almost does not itemize in light of the lack of regional HRF, which is another main challenge characterized by scarcity, unsustainability, and individuality. The reasons behind the scarcity of financial resources include the difficulty of donor conditions and procedures, allocation malpractices, and prevailing political conditions. Therefore, a plan to establish a national HR fund with a sound and adequate budget perhaps by allocating 1% of the total MoH’s budget to reach 5% by the fifth year, as well as ensuring diverse financing sources and a collective pooled contribution may be a viable solution to explore.

Thus, in light of these compelling challenges in the Palestinian context, the issue of framing a strengthening agreed strategy for HRSRIC remains a national strategic demand. The strategy required to be framed in the context of an institutionalized national governance structure for the HR in Palestine. The following aspects, promotional and professional incentives, educational capacity building programs, infrastructure investment and facilities expansion, sustainable budgets and diverse fund, and local and international partnership and cooperation, are essential foundations that should be built-in in the strategy. Eventually, HRSRIC strategy can be equated
to the Palestinians’ national struggle for building the pillars of the state institutions.

**Ethical approval**

The Research Commission of Swiss TPH approved the study (FK No. 122; approval date: 21 October 2015). Ethical approval was also obtained from the “Ethikkommission Nordwest- und Zentralschweiz” (EKNZ) in Switzerland (reference No. UBE-15/116; approval date: 23 January 2016). Ethical and administrative approval from Palestinian MoH obtained on 28 April 2016, the institutional review board of Helsinki Committee in Palestine (reference No. PHRC/HC/73/15; approval date: 7 December 2015), and the institutional review board (IRB) at Najah National University (NNU) (reference No. 112/Nov./2015, approval date: 6 December 2015).

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