Assessing Rehabilitation Systems in Conflict: A Policy Analysis of Prosthetic and Orthotic Services in Gaza, Palestine

Francesca Riccio-Ackerman[1,2,3*¶], Tarek Meah[3,4¶*], Khamis Elessi[3,5], Haidar Alkhatib[3,6], Fatima Mohammadi[3,7&], Rima Afifi[3,8&], Hugh Herr[1,2] & Deema Totah[3,9&]

1. Program in Media Arts and Sciences, MIT Media Lab, MIT, Cambridge, MA, USA.
2. K. Lisa Yang Center for Bionics, MIT, Cambridge, MA, USA.
3. Limb & Life Research Collective, Cambridge, MA, USA.
4. Program in Science, Technology & Society, Massachusetts Institute of Technology, Cambridge, MA, USA.
5. Faculty of Medicine, Islamic University of Gaza, Gaza City, Palestine.
6. GXZA Health, Gaza, Palestine.
7. Al Hadaf KC, Kansas, USA.
8. College of Public Health, University of Iowa, Iowa City, IA, USA.
9. Department of Mechanical Engineering, University of Iowa, Iowa City, IA, USA.

* Corresponding author

Email: tarekm@mit.edu

¶These authors contributed equally to this work.

&These authors also contributed equally to this work.

Abstract

The Gaza Strip is facing unprecedented levels of destruction to its healthcare system—including the provision of rehabilitation services—since the Israeli Defense Forces began its most recent military operation in October 2023. The Rehabilitation Task Force (RTF) is the governing body tasked with overseeing the provision of these services, including prosthetics and orthotics (P&O), in Gaza. Using the RTF's published documents—including reports on the state of P&O services, technical reports, and manuals/guidelines for various forms of rehabilitation services—this study aims to assess the capacity of Gaza's P&O sector to meet the needs of Palestinians seeking P&O services. The study team analyzed the RTF's documents on P&O capacity and generated ratings according to the World Health Organization's *Standards for Prosthetics and Orthotics*. The results of our study demonstrate that, despite the extremely challenging circumstances, Gaza's P&O sector excels in the domain of Policy. The targeted destruction of the rehabilitation sector and intentional withholding of resources preclude the Gaza Ministry of Health from meeting the standards in the domains of Products, Personnel, and Provision of Services. This systemic erosion of rehabilitative medical care translates into a reduced capacity to restore function and mobility to the tens of thousands of people in Gaza currently in need of such care. As such, urgent measures are required to restore, uphold, and expand the capacity of the P&O sector to serve the rights of persons with disabilities in Gaza.

Key words: Prosthetics and orthotics, Rehabilitation services, Gaza Strip, Health systems assessment, WHO standards, Disability rights

Introduction

The Gaza Strip, which is part of the internationally recognized occupied Palestinian territory (oPt), has faced unprecedented levels of destruction since the Israeli Defense Forces

(IDF) began its most recent military operation in October 2023. In the past two years, at least 78,000 civilians have been killed[1] and 170,000 have been injured, about 25% of whom need immediate and ongoing rehabilitation services.[2] Moreover, the military operation has catalyzed the widespread destruction of health services, including essential rehabilitation services.[3] This "medicide"[4] translates into a reduced capacity to meet the immediate needs of, as well as to restore function and mobility to, the tens of thousands of people in Gaza currently in need of such care.

This is not the first operation of its kind in Gaza. Since imposing a blockade in 2007, Israel has waged five military operations (2009-2010, 2012, 2014, 2021, 2023-2025) on Gaza[5], in addition to its militarized response to protesters during the Great March of Return (GMoR)[6–8]. In fact, responding to the challenges facing the rehabilitation sector following the GMoR, local and international actors established the Rehabilitation Task Force (RTF).[9] The RTF—a group led by the Gaza Ministry of Health (MoH), the World Health Organization (WHO), and Humanity and Inclusion (HI)—is the governing body tasked with overseeing the provision of rehabilitation services, including prosthetics and orthotics (P&O), in Gaza.[9] Moreover, the RTF periodically produces reports on the state of P&O services, technical reports, and manuals/guidelines for various forms of rehabilitation services.

Using these sources, the current study aims to assess the capacity of Gaza's rehabilitation system—particularly P&O care—to meet the needs of Palestinians with disabilities. We begin by providing a background on P&O care in Gaza. Next, we describe our method for collecting and assessing data from the RTF's public-facing documents. Then, we present our results before discussing how and why the ongoing Israeli assault remains the greatest challenge to the effective delivery of P&O services in Gaza. Finally, we conclude by outlining practical

recommendations for improving P&O assessment to inform capacity strengthening efforts in active crisis settings.

Methods

Conceptual Frameworks:

Two frameworks guided our analysis:

The World Health Organization (WHO)'s *Standards for Prosthetics and Orthotics:* These standards provide guidance to UN Member States to consider and implement in the establishment and maintenance of "appropriate systems and infrastructure for the provision of high-quality prosthetics and orthotics services."[10] Published in 2017, the two-part document is a collaboration between the WHO, the US Agency for International Development (USAID), and the International Society for Prosthetics and Orthotics (ISPO).

The document is divided into two parts: "Part 1: Standards"[10] and "Part 2: Implementation Manual."[11] One of its central aims is to "ensure that prosthetics and orthotics services are people-centered and responsive to every individual's personal and environmental needs."[10] The framework includes four core areas—policy, products, personnel, and provision of services (the "4 P's"):

1. **Policy** - emphasizes that governments are responsible for ensuring affordable, accessible, and high-quality P&O services through strong policy frameworks, and (ideally) universal health coverage.
2. **Products** - highlights the need for P&O products to be appropriate to the local context and affordable, supported by a national priority list to guide procurement and resource allocation.

3. **Personnel** - emphasizes the need for adequate training, regulation, and professional recognition of P&O personnel to ensure service quality and protect users, and highlights the importance of a multidisciplinary team approach, particularly for individuals with complex physical impairments.
4. **Provision of Services** - advocates for user-centered P&O services, where individuals are empowered to make informed decisions and actively participate in all aspects of care and service development.

The Convention on the rights of Persons with Disability*:* On December 12, 2006, the United Nations General Assembly adopted resolution A/RES/61/106, establishing the *Convention on the Rights of Persons with Disabilities* (CRPD). The CRPD obligates State Parties to "promote, protect, and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities"[12] through the provision of certain guarantees and liberties. The CRPD also applies to persons with disabilities in the territories over which a ratifying State Party "exercises jurisdiction" or has "effective control."[13] Israel signed the treaty in 2007 and ratified it in 2012, thereby assuming legal obligations towards persons with disabilities, including Palestinians living in the oPt. In 2014, the State of Palestine (as a "nonmember observer" of the UN) also acceded to the Convention.

Given the 4 P's alignment with core obligations under the CRPD, in addition to its relevance to rehabilitative health systems in State Parties, we focus our analysis on the standards within the framework.

Data Collection

The study team analyzed the RTF's public-facing documents on P&O care and capacity and generated ratings according to the 4 P's framework.[10,11] As of August 2025, the RTF has

published eight reports on their website. These documents represent the most authoritative and contemporaneous accounts of P&O in the Gaza Strip. Since all documents were published between October 2023 (the start of our study period) and August 2025, they were all considered for inclusion into the study. **Error! Reference source not found.** notes which were included or excluded and the corresponding rationale.

Table 1 Status of RTF documents -included or excluded and rationale for exclusion

	Report Type	Included? If not: explain why.	Report Title	Publication Date
1	Situation Report	Yes	Rehabilitation SitRep Q2 2025	June 11, 2025
2	Manual and Guideline	Yes	Minimum Rehabilitation Service Package for Gaza, oPt - Based on WHO Standards	May 5, 2025
3	Situation Report	Yes	Rehabilitation Task Force SitRep February 2025	May 3, 2025
4	News and Press Release	Yes	WHO analysis highlights vast unmet rehabilitation needs in Gaza	September 12, 2024
5	News and Press Release	No; Document does not provide information about Gaza.	Ministry of Health Inaugurates First Rehabilitation Outpatient Centers in West Bank with Funding from the Republic of Korea and Support from WHO and UNOPS	May 6, 2025
6	Assessment	No; Document does not include information specific to P&O policy, service delivery, or systems of provision.	Estimating Trauma Rehabilitation Needs in Gaza Using Injury Data from Emergency Medical Teams (30 July 2024)	September 12, 2024
7	Manual and Guideline	No; Document does not include information specific to P&O policy, service delivery, or systems of provision.	Rehabilitation Task Force Technical Note: Spinal Cord Injury Care in Gaza	May 6, 2024
8	Manual and Guideline	No; Document does not include information specific to P&O policy, service delivery, or systems of provision.	Rehabilitation Task Force Technical Note: Amputations and Prosthetics in Gaza	May 6, 2024

Data Analysis

To assess the degree to which the P&O services in Gaza were meeting the specific WHO standards, the study team devised a four-point categorical rating scale:

- Unknown: cannot make an informed decision given that specific information about the standard is not available in the evaluated data sources;
- 1: the standard was identified in the document but was not met to any extent;
- 2: the standard was identified as a goal and partially achieved; and
- 3: the standard was identified as a goal and fully achieved.

Two members of the research team (TM, FRA) independently and separately reviewed the documents listed in **Error! Reference source not found.**, recording preliminary ratings for each WHO standard. Following independent review, the two raters convened to reconcile discrepancies and to develop a preliminary consensus. This was subsequently circulated to two additional team members (RA, DT) both with expertise in rehabilitation and public health systems, for critical review, comments, and questions. Final ratings were then determined through discussion to achieve consensus among five team members (TM, FRA, RA, DT, FM).

Data Organization

The WHO Standards for P&O are organized into a hierarchy (see Fig 1), beginning with the 4 P areas. In the original WHO document, some but not all areas cascade down to several major categories (e.g. Policy is divided into “Leadership and Governance” and “Financing”). Each category is then separated into Subcategories (e.g., “Leadership and Governance” consists of “Stakeholders and Coordination,” “Guiding Framework for Provision,” “Monitoring,” etc. and each subcategory includes at least one standard (e.g., “Stakeholders and Coordination” includes three individual standards. Several subcategories were not couched within a larger category and

were given a category title by the study team; these are marked with an asterisk in Fig 1. There were sixty total P&O standards across four areas.

Fig 1 WHO Standards for Prosthetics and Orthotics

The study team assessed and provided ratings for all sixty standards. For simplicity, we present results at the subcategory level. For complete detailed ratings at category, subcategory, and individual standard levels, refer to S1 Table. The study team assessed and provided ratings for all sixty standards. However, we present results at the level of the category only. Complete detailed ratings at the category, subcategory, and individual standard level are available in S1 Table for reference.

Ethics Statement

This study did not require an ethics review since it analyzed publicly available secondary data and did not include human participants.

Positionality Statement

The authors of this paper are Palestinian, have Palestinian relatives, and/or are academics in engineering or the social sciences. Several have firsthand experience of Israeli aggression in Palestine (West Bank and Gaza) or Lebanon. One author is a person who has experienced the loss of two limbs, has lived experience with this disability and has access to advanced P&O care and assistive technology/devices. Another author has an immediate family member with an amputation. We sought to mitigate author bias by relying on WHO reports and frameworks for analysis. We also sought to mitigate power imbalances by including research from Palestine, specifically Gazan health care sources. The authors include professionals in healthcare living in Gaza at the time of writing.

Results

Category ratings indicate current strengths and challenges of the Gaza's P&O sector. We summarize details for each category below. **Error! Reference source not found.** provides the text for each standard under the category/subcategory, and S1 Table includes standard-level ratings.

Table 2 WHO Standards for Prosthetics and Orthotics, Part I

AREA	CATEGORY	SUBCATEGORY	STANDARD	TEXT OF STANDARD
Policy	Leadership & Governance	Stakeholders and Coordination	1	Governments should assume a leading role in the development and coordination of national prosthetics and orthotics service provision.
			2	Governments should involve all relevant stakeholders – including service users, caregivers and user groups – in policy development, planning, implementation, monitoring and evaluating prosthetics and orthotics services.
			3	A national prosthetics and orthotics committee or similar entity, with a wide range of stakeholders, should be in place for the coordination and development of national prosthetics and orthotics service provision.
		Guiding Framework for Provision	4	There should be a national guiding framework for prosthetics and orthotics service provision.
			5	Prosthetics and orthotics service provision should be regulated by the State.
		Monitoring	6	Prosthetics and orthotics service should be monitored nationally and regionally.
		International Coordination and Cooperation	7	Governments and national stakeholders should collaborate internationally and share experience, data and on prosthetics and orthotics service provision.
		International Support	8	International support, when provided, should contribute to the establishment and implementation of national prosthetics and orthotics policies and strategic plans and be

				aligned with the provision system of the national health and welfare service.
			9	The cost of providing prosthetics and orthotics services should be assessed periodically.
		Economic analysis for provision	10	The direct and indirect economic benefits of prosthetics and orthotics services should be analysed at individual, family, community, society, health sector and national levels.
			11	Prosthetics and orthotics services should be an integral part of universal health coverage.
		Funding for services	12	Prosthetics and orthotics services should be included in national health and social insurance systems, like other health interventions.
	Financing		13	Data on prosthetics and orthotics service provision should be collected periodically, analysed at service level and shared at national level.
		Information	14	A national prosthetics and orthotics database should be established to identify total need, types of need and unmet need.
		Promotion of services	15	Strategies for raising awareness about prosthetics and orthotics services should be established, including rights-based, social and economic arguments.
			16	An appropriate range of prosthetic and orthotic products should be available in countries to suit local needs and realities.
		Types	17	A national list of priority prosthetic and orthotic products should be drawn up, respected and updated regularly.
			18	International standards should be used for national classification of prosthetic and orthotic products.
Products	Range and Availability		19	Components, materials, consumables, tools, machines and other equipment used exclusively for fabrication of prosthetic and orthotic products that are not available in a country should be exempt from import duty and customs fees.
		Supply of Materials	20	Reuse of prosthetic and orthotic components should be regulated by a designated authority or

				group of experts with no conflict of interests and involve proper quality control and documentation.
	Regulation	Technical standards	21	National regulation of prosthetic and orthotic products, components and materials should be an integral part of the national health care regulatory system.
			22	Prosthetic and orthotic products should be tested structurally for compliance with ISO or equivalent standards before being sold on the market.
	Development	Research and development	23	Clinical and technical research should be conducted in prosthetics and orthotics, and the results should be shared nationally and globally.
			24	Affordable prosthetic and orthotic products that are cost–effective, of good quality and context-appropriate should be developed and made widely available.
Personnel	Staff	Personnel	25	Prosthetics and orthotics services should be provided by competent, adequately trained professionals.
			26	Complicated prosthetics and orthotics treatment and care of complex cases should be provided by a multidisciplinary team of professionals with complementary skills.
	Training	Core personnel	27	Training in prosthetics and orthotics should be aligned with national and international educational standards.
			28	Training in prosthetics and orthotics should be available at various levels to fully meet national needs.
		Other personnel	29	Health care professionals, especially rehabilitation professionals, who provide treatment relevant to prosthetics and orthotics services should have adequate knowledge about prosthetics and orthotics.
		Continuing development	30	Continuing professional development should be compulsory in prosthetics and orthotics professional practice.
	Workforce	Planning the workforce	31	Workforce planning should take into account all the disciplines

				required in prosthetics and orthotics services at all levels.
			32	Prosthetics and orthotics service units should have at least one prosthetist and orthotist to supervise and guide clinical and technical work.
			33	A strategy to retain prosthetics and orthotics personnel should be in place.
			34	Prosthetics and orthotics clinicians should be regulated by the State within regulations for health professionals.
		Professional regulation and recognition	35	Prosthetists and orthotists should assume responsibility for services provided by associate and nonclinical personnel under their supervision.
			36	Prosthetics and orthotics personnel should have a clear career structure and employment conditions that are aligned with those of other health care professionals, associates and technical personnel.
		User-centered service delivery	37	A documented policy to safeguard the rights of users of prosthetics and orthotics services should be in place and in effect, outlining the features of user-centred services.
Provision of Services	User-Centered Input		38	Service users and their representatives should be involved in policy-making, planning, implementing, monitoring and evaluating prosthetics and orthotics services, take part in decision-making at all levels and be represented on relevant committees.
			39	Service users should be given the opportunity to choose their service provider and technology, including components and materials, according to their need, among the options available in the country and the limits set for financing or reimbursement.
	Systems for Delivering Services	Inclusive service delivery	40	Prosthetics and orthotics services should be accessible to all the people who need them: girls, boys, women, men and older adults.

		41	Prosthetics and orthotics services should be part of the health sector or be closely linked to it.
		42	Prosthetics and orthotics services should be delivered in a three-tier system, at primary, secondary and tertiary levels, with established links and two-way pathways for referral and follow-up.
		43	Maintenance and repair services should be an integral part of a prosthetics and orthotics service delivery system.
	Inclusive service delivery in disaster contexts	44	The provision of prostheses and orthoses in disaster conditions should be an integral part of the health sector response and be planned to ensure a seamless transition to long-term service provision.
	Setting	45	Prosthetics and orthotics service units should be established within or closely linked to health and rehabilitation service facilities, such as district and referral hospitals.
		46	The possibility of integrating prosthetics and orthotics service units into broader services for assistive products should be considered and explored.
	Infrastructure	47	At all service levels, prosthetics and orthotics units should be designed to ensure effective, efficient, high-quality service provision in a user-friendly, barrier-free, safe clinical environment.
	Equipment	48	Prosthetics and orthotics service providers should define and adhere to a plan for equipment maintenance and replacement.
	Safety	49	The safety of service providers and users should be ensured by the establishment of documented health and safety regulations.
	Identification and referral	50	Prosthetics and orthotics service providers should identify and train partners in identifying and referring potential users.
Service Unit Processes	Service delivery	51	All steps in the delivery of prosthetics and orthotics services should be based on the best available evidence and should

			adhere to local, national and international standards and practice.
	Assessment	52	Service providers should involve service users and caregivers in assessment, setting goals and planning treatment.
		53	Peer support and counselling should be available to service users as appropriate.
	Fabrication and fitting	54	Prosthetics and orthotics personnel should follow the instructions and guidelines of the component manufacturer and document any deviation from standard practice.
	User training	55	Service users should be given sufficient training to ensure safe, effective use of prostheses and orthoses. Family members and caregivers should be involved as appropriate.
		56	Users or caregivers should make the final decision about the acceptability of the fit and function of the prosthesis or orthosis.
	Product delivery and follow-up	57	The outcome of prosthetics and orthotics treatment should be evaluated and documented.
		58	Prosthetics and orthotics service users should be followed up regularly.
	Management	59	Annual and long-term strategic and operational plans should be in place, with performance indicators for continuous monitoring.
		60	The required quality should be defined and adhered to at all levels and in all parts of the prosthetics and orthotics service delivery system.

The overall category scores demonstrate that, despite the extremely challenging circumstances, Gaza's P&O sector excels in the domain of Policy. However, the targeted destruction of the rehabilitation sector[14] and intentional withholding of resources[15] preclude the Gaza MoH from meeting the standards in the domains of Products, Personnel, and Provision of Services (Fig 2).

Fig 2 Category-level ratings produced from averaging the subcategory ratings. Individual standard ratings within each subcategory are in S1 Table.

Policy

1. Leadership and Governance – 2.64/3.00

   This score is reflective of the RTF's commitment and success in guiding and monitoring the provision of formal P&O services in Gaza. This process requires significant international cooperation, as demonstrated by WHO's and H&I's participation in coordinating and supporting on-the-ground interventions. However, while the RTF specifies alignment with WHO guidelines for P&O care and ISO standards for the development and provision of P&O services,[2,3] there is little evidence that suggests the body is regulating and/or monitoring the provision of informal services.

2. Financing – 2.08/3.00

   The RTF excels in providing costs and raising awareness about P&O services, yet, to the best of the study team's knowledge, does not provide economic analyses of the direct and indirect benefits of these services in public-facing reports. Furthermore, from the RTF's reports, it is unclear whether P&O services are considered part of universal health coverage.

Products

1. Range and Availability – 2.03/3.00

   The RTF provides a list of priority P&O products and abides by international standards to classify these needs. However, the RTF reports that the lack of equipment precludes service delivery in 100% of inpatient rehabilitation services, 100% of prosthetic and orthotic services, and 88% of outpatient services.[3]

2. Regulation – 2.83/3.00

The P&O products which the RTF regulates are an integral component of the health care regulatory system in Gaza. Additionally, these products—because they are mostly provided by international NGOs—already meet ISO or equivalent standards. Moreover, the MoH has committed to upholding this compliance, per the Minimum Rehabilitation Service Package (MRSP).[16]

3. Development – 1.83/3.00

According to the MRSP, the MoH has stated a commitment to developing affordable, high-quality, and context-appropriate products.[16] However, the ongoing military hostilities and siege of medical supplies have resulted in (per the February and June situation reports) notable gaps in assistive products for people with existing injuries[3] and insufficient materials[2] to address all the needs.

Personnel

1. Staff – 2.00/3.00

Appropriate training is available for existing staff, however capacity is extremely limited[3], especially in light of the massive increase of individuals requiring P&O services. Furthermore, Israel's targeted killings and forced displacement of healthcare workers has further reduced the P&O workforce.[17]

2. Training in P&O – 1.94/3.00

Given the limited number of P&O personnel operating in Gaza and the ongoing crisis, the RTF has invested its resources in meeting the immediate needs of patients with disabilities, as opposed to longer-term training. Despite the challenges, however, the RTF is assisting in the development of a national training framework for rehabilitation with its

partners.[2] UK-Med, for example, has been preparing a capacity building initiative via online training as of June 2025.[2]

3. Workforce – 1.78/3.00

Current conditions severely restrict meaningful workforce planning as healthcare professionals have been forced to flee or have been detained and/or killed. Moreover, per the RTF's June 2025 situation report, there were only 9 trained prosthetists and orthotists (CPOs) in Gaza,[2] serving a population of 2.1 million people.[18] However, per the WHO standards—which recommend 5-10 P&O clinicians per million population—there should be between 10 to 20 CPOs.[12]

Provision of Services

1. User-Centered Input – 1.50/3.00

To the best of the study team's knowledge, the RTF has not reported on user-centered input in its public-facing documents.

2. Systems for Delivering Services – 2.01/3.00

Challenges to delivering services include destruction of facilities, lack of equipment and supplies, and staff shortages.[3,17] Despite this, however, the RTF is able to maintain close linkage with the health sector and coordinate service delivery across primary, secondary, and tertiary levels, ensuring established referral pathways for individuals requiring prosthetic and orthotic care.[16]

3. Service Unit Processes – 2.25/3.00

Per the RTF reports, multi-disciplinary rehabilitation services exist throughout the Strip, and a referral network is described.[2,3] Moreover, data and outcomes are collected and shared at multiple health delivery service unit (HDSU) levels for rehabilitation

services in the WHO's Health Resources and Services Availability Monitoring System.[3] However, the limitation in this category, per the RTF, is meeting the volume of services required and following up with treated patients because of continuous forced displacement.[3]

Discussion

This paper assessed the post-October 2023 state of rehabilitation services—specifically P&O care—in Gaza, oPt using the WHO's 4 P's framework. Our analysis enables a structured evaluation of both systemic strengths and opportunities for strengthening rehabilitative care. A contemporaneous understanding of the P&O sector is critical to measure the damage against persons with disabilities, to assess the services needed to ensure their rights and wellbeing, and to inform rebuilding efforts. The findings demonstrate that, despite the existence of policy frameworks, the systematic destruction of the healthcare system—including infrastructure, workforce, and resources—has severely limited Gaza's capacity to provide meaningful care; this is despite RTF members' demonstrated awareness of international standards, earnest attempts at meeting them at all levels, and their commitment to documentation. This systemic erosion of rehabilitative medical care translates into a reduced capacity to restore function and mobility to the tens of thousands of people in Gaza currently in need of such care.

Israeli Violations of the CRPD

Israel's current military actions in the oPt have raised serious concerns regarding non-compliance with the provisions of the CRPD[12] and these concerns have intensified over the past 23 months. Israeli forces have destroyed rehabilitation warehouses and facilities,[4,14] severely restricted access to medical supplies,[15] targeted medical staff,[19] and displaced populations with disabilities,[20] resulting in conditions that undermine the rights guaranteed under the CRPD

including, but not limited to, freedom from violence (Article 16), liberty of movement (Article 18), personal mobility (Article 20), and access to habilitation and rehabilitation (Article 26).

According to the United Nations Relief and Works Agency (UNRWA), persons with disabilities in Gaza currently face "disproportionate risks and challenges," including physical and informational barriers, as well as electricity-depleted assistive devices.[21] Additionally, the UN Committee on the Rights of Persons with Disabilities noted that persons with disabilities in Gaza fear being "the first and the next to be killed,"[20] due to their limited ability to flee. Such infringements reveal not only systemic collapse in Gaza's health sector, but also Israel's violation of its own commitment to the CRPD, and its ongoing obstruction of the State of Palestine's ability to meet its obligations under the CRPD. These infringements on the rights of Palestinians with disabilities—as guaranteed to them by the CRPD—are not new. Scholars have long documented how Israeli military campaigns in Gaza have strained the already fragile healthcare system in Gaza.[22,23]

Limitations of the Current Study

The first limitation to the current study is data availability. As a first attempt to assess the quality of the P&O sector in Gaza, this analysis utilized only publicly available RTF documents in English, as official communication from the leadership in the rehabilitation sector of Gaza. Direct fieldwork with and first-hand accounts from patients, healthcare workers, and health sector leaders would greatly contribute to a more comprehensive understanding of rehabilitation services in Gaza.

Another key limitation to consider is the scope of existing WHO P&O standards. These standards were not specifically developed for use in conflict, developing or destroyed health systems, especially in active crisis settings; thus providing insufficient implementation guidance

for developing local P&O capacity in these contexts. The standards also suggest singular pathways for achieving key metrics, as opposed to adaptive strategies to account for resource-limited P&O sectors. Finally, the standards do not thoroughly account for cultural considerations that affect P&O use.

Implications for research, practice, and action

As noted above, the WHO 4 P's framework is insufficient for assessing systems in conflict zones, particularly those that are actively targeted and besieged by external forces. Future work should expand upon the existing assessment frameworks to allow identification of the root causes preventing successful fulfillment of rehabilitation services. Such holistic approaches would direct accountability where it belongs—toward the actors and conditions that deliberately undermine health systems—and to call out these violations with evidence, clarity, and moral force.

In response to the ongoing crisis in Gaza, the study team presents a tiered list of critical action items for ensuring P&O rehabilitative medical care that conforms to the WHO 4Ps is available for persons with Disabilities in Gaza (**Error! Reference source not found.**), noting its time periodicity and responsible parties. Given the impact of Israeli military aggression, the most critical action is a permanent end to the Siege and an immediate and permanent cease fire, which also allows Palestinian self-determination. Other immediate, short-, medium-, and long-term actions are recommended.

Table 3 Critical Action Items for ensuring minimum P&O rehabilitative medical care is available for persons with disabilities in Gaza

Time Period	Actions	Responsible Parties
Immediately	• A permanent end to the widespread aggression against the civilian population and infrastructure of Gaza	State of Israel; International Governing and Collaborating Parties

	• End the use of cluster munitions and high velocity weaponry, stop all harm against civilians and especially persons with disabilities • Stop targeted attacks against healthcare workers, first responders, and healthcare facilities • End the siege which indiscriminately causes preventable suffering, disease and death • Provide sufficient food, medicine and humanitarian aid to the population in Gaza, and targeted aid to the injured population • Coordinated entry of conflict medicine specialists, healthcare workers and administrators to assess and assist with immediate rehabilitation needs	
Short-Term	• Use of mobile and field-based P&O services • Collaborative assessments of immediate needs and challenges of persons with disabilities and those requiring long-term rehabilitative care	Gaza Ministry of Health; financial supporters; humanitarian organizations
Medium-Term	• Investment in workforce training (including remote/distance learning models for P&O) • Standardized protocols for triage and follow-up • Rehabilitation integration with trauma care	Gaza Ministry of Health; financial supporters; humanitarian organizations; academic institutions (local and international)
Long-Term	• Incorporation of P&O into national health and insurance systems • Sustainable financing mechanisms • Stability in the legal and policy frameworks necessary to ensure compliance with international guidelines	State of Israel, Gaza Ministry of Health; financial supporters

Conclusion

The findings of this analysis demonstrate that, despite the existence of policy frameworks, the systematic destruction of the healthcare system—including infrastructure, workforce, and resources—has severely limited Gaza's capacity to provide meaningful care. In line with international obligations, urgent measures are required to restore, uphold, and expand the capacity of the P&O sector to serve the rights of persons with disabilities in Gaza. We urge attention to this critical gap.

Word count: 2932

Supporting Information

S1 Table. WHO Standards.

Acknowledgments

The authors acknowledge the clinicians and humanitarian partners working in Gaza who, despite the ongoing bombardment, remain committed to providing care to the thousands of civilians who continue to sustain injuries. We also acknowledge the members of the Rehabilitation Task Force, whose data made this analysis possible.

References

1. Gómez-Ugarte AC, Chen I, Acosta E, et al. Accounting for uncertainty in conflict mortality estimation: an application to the Gaza War in 2023-2024. Popul Health Metr. 2025; 23(55): 1–15.

2. Rehabilitation Task Force. Rehabilitation SitRep Q2 2025. 2025 Jun 11 [cited 2025 Jun 20]. In: ReliefWeb Response [Internet]. Available from: https://reliefweb.int/report/occupied-palestinian-territory/rehabilitation-sitrep-q2-2025

3. Rehabilitation Task Force. Rehabilitation Task Force SitRep February 2025. 2025 May 3 [cited 2025 Jun 20]. In: ReliefWeb Response [Internet]. Available from: https://reliefweb.int/report/occupied-palestinian-territory/rehabilitation-sitrep-q2-2025

4. OHCHR. UN experts appalled by relentless Israeli attacks on Gaza's healthcare system. 2025 Aug 13 [cited 2025 Sep 22]. In: Press Releases | Special Procedures [Internet]. Geneva: United Nations. Available from: https://www.ohchr.org/en/press-releases/2025/08/un-experts-appalled-relentless-israeli-attacks-gazas-healthcare-system

5. Council on Foreign Relations. Israeli-Palestinian Conflict Timeline. 2025 Jun 24 [cited 2025 Oct 10]. In: CFR Education [Internet]. Washington, D.C.: Council on Foreign Relations. Available from: https://education.cfr.org/learn/timeline/israeli-palestinian-conflict-timeline

6. Dana T. A Cruel Innovation: Israeli Experiments on Gaza's Great March of Return. Sociol Islam 2020; 8(2): 175–198.

7. Jones C. Gaza and the Great March of Return: Enduring violence and spaces of wounding. Trans Inst Br Geogr 2023; 48(2): 249–262.

8. Obermaier L. Disabling Palestine: the case of Gaza's Great March of Return. Race Cl 2024; 65(3): 27–46.

9. ReliefWeb Response. Rehabilitation Task Force. N.d. [cited 2025 May 30]. Available from: https://response.reliefweb.int/palestine/rehabilitation-task-force.

10. World Health Organization. Standards for Prosthetics and Orthotics: Part 1: Standards. 2017 [cited 2025 May 30]. Available from: https://iris.who.int/server/api/core/bitstreams/0288426b-1f89-4fc8-ab83-a653107a657e/content

11. World Health Organization. Standards for Prosthetics and Orthotics: Part 2: Implementation Manual. 2017 [cited 2025 May 30]. Available from: https://iris.who.int/server/api/core/bitstreams/495c100c-9bb2-4577-8354-8efa294c9ecd/content

12. United Nations Department of Economic and Social Affairs. Convention on the Rights of Persons with Disabilities (CRPD). 2007 [cited 2025 Sep 22]. Available from:

https://social.desa.un.org/issues/disability/crpd/convention-on-the-rights-of-persons-with-disabilities-crpd

13. UN Committee on the Rights of Persons with Disabilities. Concluding Observations on the Initial Report of Israel. 2023 Oct 9 [cited 2025 Sep 22]. Available from: https://docs.un.org/en/CRPD/C/ISR/CO/1

14. Humanity & Inclusion. Gaza: Destruction of HI's warehouse in Rafah. 2024 Jun 12 [cited 2025 July 30]. [Internet]. Gaza: Humanity & Inclusion. Available from: https://www.hi-us.org/en/gaza--destruction-of-hi-s-warehouse-in-rafah

15. Physicians for Human Rights. "We Could Have Saved So Many More": Anguish and Death Caused by Israel's Restrictions on Medical Supplies in Gaza. 2025 Jul 9 [cited 2025 July 30]. In: Resources | Multimedia [Internet]. New York: Physicians for Human Rights. Available from: https://phr.org/our-work/resources/we-could-have-saved-so-many-more-anguish-and-death-caused-by-israels-restrictions-on-medical-supplies-in-gaza/

16. Rehabilitation Task Force. Minimum Rehabilitation Service Package for Gaza, oPt - Based on WHO Standards. 2025 May 5 [cited 2025 Sep 26]. In: Manual and Guideline. occupied Palestinian Territory: World Health Organization. Available from: https://reliefweb.int/report/occupied-palestinian-territory/minimum-rehabilitation-service-package-gaza-opt-based-who-standards

17. World Health Organization. WHO Analysis Highlights Vast Unmet Rehabilitation Needs in Gaza. 2024 Sep 12 [cited 2025 Oct 3]. In: News and Press Release [Internet]. Jerusalem, Cairo, Geneva: World Health Organization. Available from: https://reliefweb.int/report/occupied-palestinian-territory/who-analysis-highlights-vast-unmet-rehabilitation-needs-gaza-enar

18. OCHA. Reported impact snapshot | Gaza Strip (25 June 2025). 2025 Jun 2025 [cited 2025 Sep 29]. [Internet]. Available from: https://www.ochaopt.org/content/reported-impact-snapshot-gaza-strip-25-june-2025

19. Loulou M, Ben Dror O. Unlawfully Detained, Tortured, and Starved: The Plight of Gaza's Medical Workers in Israeli Custody. Physicians for Human Rights. 2025 Feb [cited 2025 Jul 30].

20. UN Committee on the Rights of Persons with Disabilities. Palestinians with Disabilities Subject to Unbearable Consequences of the Ongoing Hostilities and Violence in the OPT. 2024 May 27 [cited 2025 July 30]. In: Press Release [Internet]. United Nations. Available from: https://www.un.org/unispal/document/palestinians-with-disabilities-subject-to-unbearable-consequences

21. UNRWA. Protection in the Gaza Strip. 2024 Nov [cited 2025 Jul 30]. [Internet]. UNRWA. Available from: https://www.unrwa.org/activity/protection-gaza-strip

22. Heszlein-Lossius HE, Al-Borno Y, Shaqqoura S, et al. Life after conflict-related amputation trauma: a clinical study from the Gaza Strip. BMC Int Health Hum Rights 2018; 18(1): 34.

23. Majadli G, Ziv H. Amputating the Body, Fragmenting the Nation: Palestinian Amputees in Gaza. Health Hum Rights 2022; 24 (2): 281–292.

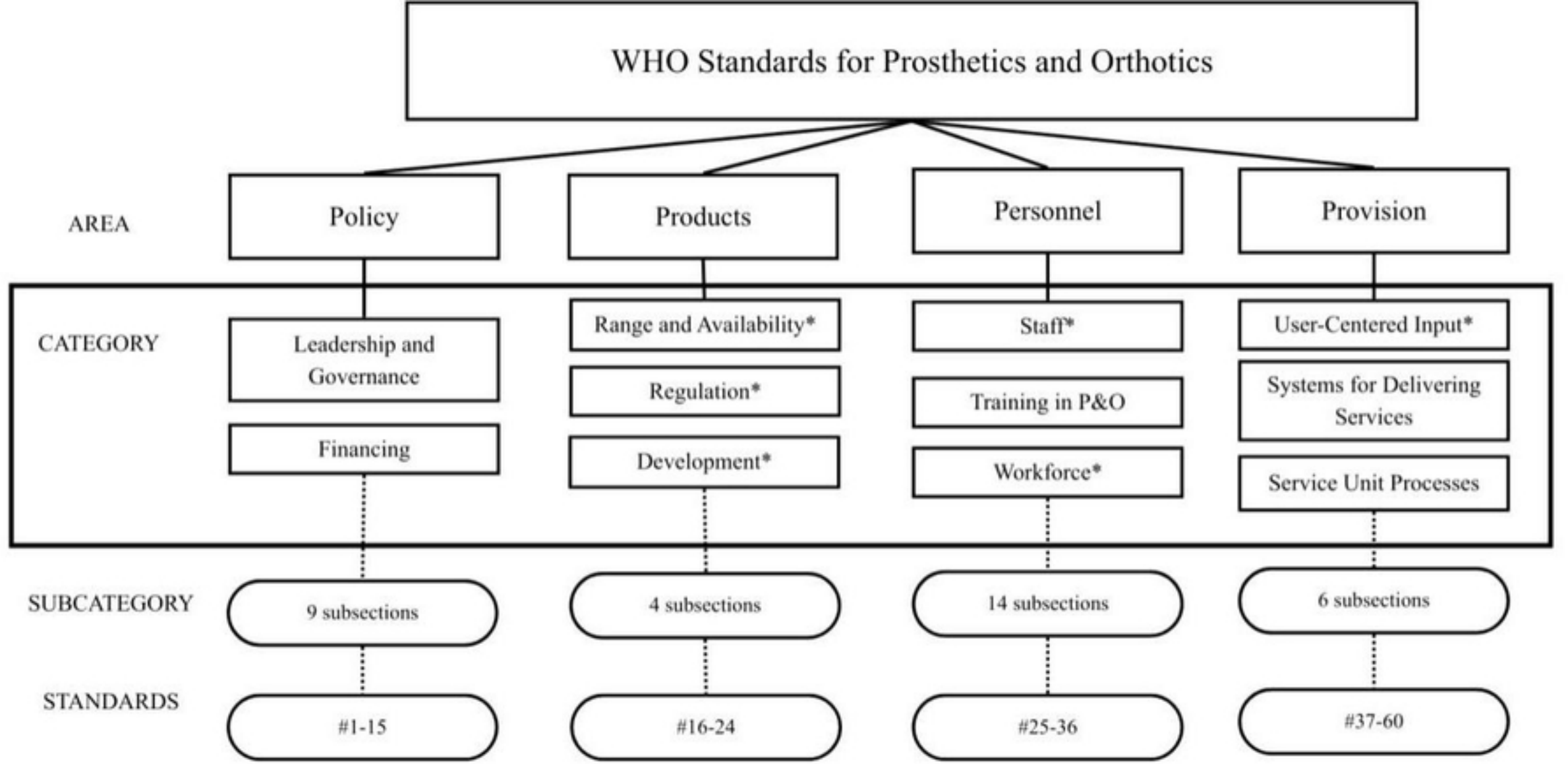
WHO Standards for Prosthetics and Orthotics
AREA
Policy
Products
Personnel
Provision
CATEGORY
Leadership and Governance
Financing
Range and Availability*
Regulation*
Development*
Staff*
Training in P&O
Workforce*
User-Centered Input*
Systems for Delivering Services
Service Unit Processes
SUBCATEGORY
9 subsections
4 subsections
14 subsections
6 subsections
STANDARDS
#1-15
#16-24
#25-36
#37-60

Figure 1

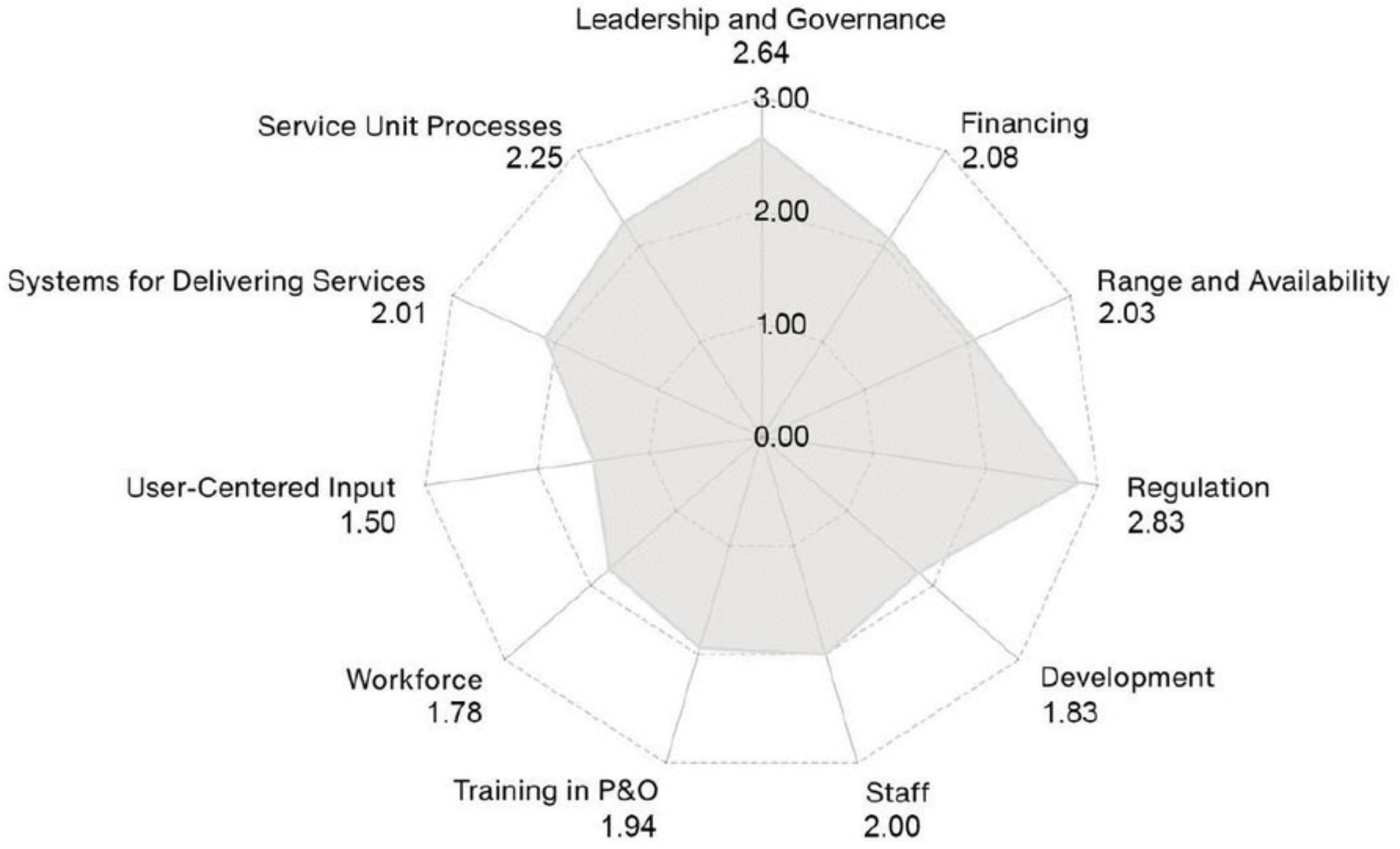
Leadership and Governance
2.64
3.00
Financing
2.08
2.00
Range and Availability
2.03
1.00
Regulation
2.83
0.00
Development
1.83
Staff
2.00
Training in P&O
1.94
Workforce
1.78
User-Centered Input
1.50
Systems for Delivering Services
2.01
Service Unit Processes
2.25

Figure 2