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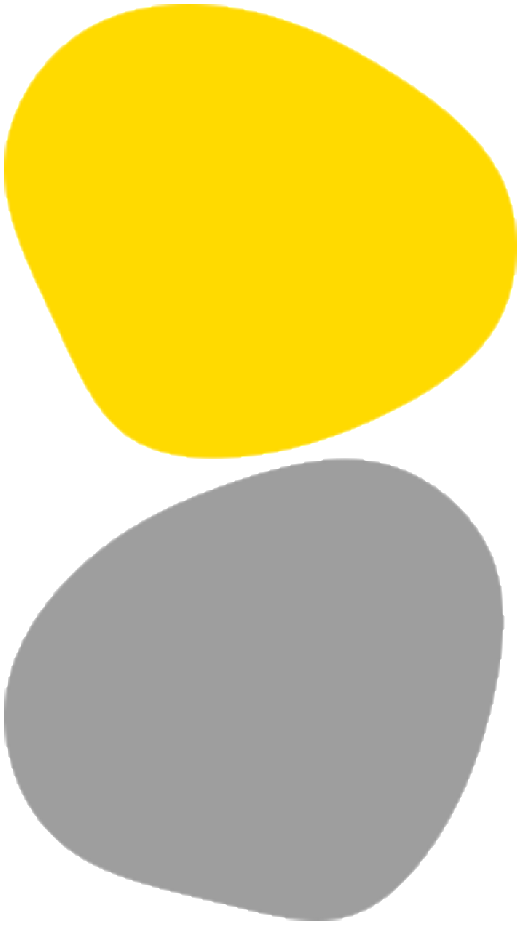
TERAPIA OCUPACIONAL

Toward mapping the occupational therapy supply and distribution in Portugal: framework development, situational analysis of the data system, and an international data system comparison with implications for mental health

Pedro Costa Monteiro



09/**2025**

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*Dissertation submitted in partial fulfillment of the requirements for the **Master's degree in Occupational Therapy – Specialization in Rehabilitation and Mental Health** at the School of Health, Polytechnic Institute of Porto.*

Mention of financial support

Dissertation project developed as the result of a mobility program, through the *Fulbright Research Grant with the support of FLAD – Portuguese-American Foundation for Development, 2024/2025*

Agradecimentos

"Comece por fazer o necessário, depois o possível e, de repente, estará a fazer o impossível",
São Francisco de Assis

"Vale mais uma resposta aproximada à pergunta certa, do que uma resposta certa à pergunta errada". Foi com esta frase que, em setembro de 2023, a Professora Maria João iniciou a segunda aula de metodologias de investigação do mestrado em Terapia Ocupacional. Esta mesma frase tornou-se ponto de referência para o percurso realizado ao longo do mestrado. Deste modo, a bússola foi norteada pela busca constante por perguntas com profundidade, coragem e rigor, que apontassem quais os caminhos a trilhar. O percurso fez-se, assim, das pessoas e oportunidades advindas desse processo:

Em primeiro lugar, agradeço o apoio da equipa de orientação e dos restantes colegas da E2S. Agradeço especialmente à Professora Paula Portugal e à Professora Maria João pelo apoio para sonhar e concretizar não menos do que o melhor de que sou capaz, sustentando as perguntas ambiciosas que fui levantando. De um modo particular, agradeço à Professora Raquel Almeida pela confiança transmitida, por desafiar os meus limites constantemente e por continuar a ser um exemplo de rigor, entrega e disponibilidade – obrigado!

Agradeço também o apoio extraordinário da Comissão *Fulbright Portugal* e da *FLAD*, bem como das suas comunidades e membros. De um modo particular, agradeço à Dra. Sofia Wahnon pelo incansável suporte antes, durante e após a mobilidade para os Estados Unidos, bem como ao Mauro Franqueira por ser um exemplo de determinação e resiliência. Do mesmo modo, agradeço à Dra. Rosália Fonte e à Dra. Rita Geriante pelo apoio próximo e constante.

Agradeço aos amigos que comigo caminharam por trilhos incertos, particularmente ao Miglas, pelo apoio perseverante enquanto longe, mas sobretudo pelo ombro amigo na reta final. Agradeço igualmente com carinho à minha família, nomeadamente à Maria, à Gaby, ao Tomás e ao Baby Joaquim, pela amizade, entrega e pelo espírito aventureiro: You're a DKOB!

De um modo muito especial, agradeço ao meu pai, Nuno, à minha mãe, Carla, à minha irmã, Ana e à Manuela – nenhum fruto seria colhido se não fosse pela vossa entrega, paciência ânimo e dedicação a uma sementeira exigente e que demora a dar fruto.

De um modo singular, agradeço ao Tiago, à Cátia, à Ema, à Íris e ao Snoopy: foram casa e porto-seguro desde o primeiro momento. Tornaram-se família e são uma verdadeira alegria na minha vida - mesmo nos jogos de Sueca!

De um modo notável, agradeço ao Tiago: parti com o objetivo de ser orientado e aprender, e tenho recebido muito mais do que posso dar. Regressei com um rigoroso orientador, um grande mentor e um bom amigo – obrigado!

Por fim, agradeço à Ana pelo exemplo absoluto de entrega e excelência, o amparo em todos os momentos, a entrega e a dedicação.

AMDG

Resumo

O aumento global das necessidades de reabilitação, Terapia Ocupacional (TO) e Saúde Mental (SM) contrasta com carência de recursos humanos (RH) e lacunas de dados, limitando políticas baseadas em evidência. Esta dissertação enquadra-se em Investigação em Serviços de Saúde e analisa o sistema de dados de RH da TO e SM TO em Portugal. Foi desenvolvido um enquadramento conceptual da oferta de RH em TO, incorporando indicadores de SM e uma *Checklist* para recolha de dados. Este enquadramento foi aplicado para identificar dados existentes e lacunas em Portugal, complementado por análise SWOT e informado pela comparação com os Estados Unidos.

Os resultados revelaram dados fragmentados e inconsistentes, sem mecanismos integrados para monitorizar oferta e distribuição de TOs e TOs em SM. Embora fontes profissionais e governamentais forneçam informação parcial, os dados existentes permanecem limitados em âmbito, estratificação e acessibilidade.

O estudo conclui que o reforço da infraestrutura de dados de RH da TO em Portugal é essencial para promover oferta e distribuição equitativa de serviços de TO e SM, respondendo às necessidades populacionais. As recomendações incluem criar indicadores padronizados, integrar dados entre sistemas e adotar boas práticas internacionais para fortalecer os RH da TO e da TO em SM.

Palavras-chave: Terapia ocupacional, dados da força de trabalho, saúde mental, reabilitação, Portugal

Abstract

The global rise in rehabilitation, occupational therapy (OT), and mental health (MH) needs contrasts sharply with persisting workforce supply shortages and data gaps that limit evidence-based policy. This dissertation situates itself within Health Services Research (HSR) and examines the Portuguese OT workforce data system, with particular attention to MH. A conceptual framework of OT workforce supply was developed, incorporating MH indicators and a data collection checklist. The framework was applied to identify existing data, sources, and gaps in Portugal, complemented by a situational analysis (SWOT) and informed by a comparison with the United States.

Findings revealed fragmented and inconsistent data availability, with no integrated mechanism to monitor OT or MH OT supply and distribution. While some professional and governmental sources provide partial insights, data remains limited in scope, stratification, comparability and accessibility.

The study concludes that strengthening Portugal's OT workforce data infrastructure is essential for advancing equitable supply and distribution of OT and MH services to meet population needs and demands. Recommendations include establishing standardized workforce indicators, integrating data across sources, and adopting the best international practices for the strengthening of the OT and MH OT workforce.

Keywords: Occupational therapy, workforce data, mental health, rehabilitation, Portugal

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Index of Abbreviations

American Occupational Therapy Association (AOTA)

Administração Central do Sistema de Saúde (ACSS)

Associação Portuguesa de Terapeutas Ocupacionais (APTO)

Canadian Institute for Health Information (CIHI)

Council of Occupational Therapists for the European Countries (COTEC)

Direção Geral de Saúde (DGS)

Direção-Geral de Ensino Superior (DGES)

Direção-Geral de Estatísticas da Educação e Ciência (DGEEG)

Entidade Reguladora da Saúde (ERS)

Global Burden of Disease (GBD)

Health Services Research (HSR)

Human Resources for Health (HRH)

Human Resources for Health Information Systems (HRHIS)

Instituto Nacional de Estatística (INE)

International Standard Classification of Occupations (ISCO)

Mental Health (MH)

National Health Workforce Accounts (NHWA)

National Institutes of Health (NIH)

Occupational Therapy (OT)

Physical Therapy (PT)

Registo de Alunos Inscritos e Diplomados do Ensino Superior (RAIDES)

Sistema Nacional de Saúde (SNS)

Speech-language Pathology (SLP)

Strengths, Weaknesses, Opportunities and Threats (SWOT)

Translational Research (TR)

World Federation of Occupational Therapists (WFOT)

World Health Organization (WHO)

1. Introduction

While the global need for rehabilitation, Occupational Therapy (OT) and Mental Health (MH) services is rising, most notably due to population ageing, chronic disease, and improved survival from previously fatal conditions, the availability and distribution of the rehabilitation workforce remains insufficient or inequitable. Access challenges are particularly acute in rural and remote areas, where services and professionals are concentrated in urban centres. These disparities underline a persistent gap between the growing demand for rehabilitation and the limited supply of appropriately distributed and resourced services. Beyond workforce shortages, barriers are compounded by the scarcity of timely, reliable, and actionable health data, which restricts the capacity of policy-makers to design evidence-based strategies and allocate resources effectively. Addressing these inequities is not only a matter of public health but also one of equity, human rights, and social justice, as universal health coverage cannot be realised without the inclusion of rehabilitation, OT and MH.

Against this background, the present dissertation positions itself within the field of Health Services Research (HSR), with a focus on the rehabilitation workforce. The work does not aim to map existing resources directly, as the data gaps identified render such an effort premature. Instead, it takes a forward-looking stance toward building the conditions that would make systematic mapping possible. In particular, it seeks to assess the Portuguese OT workforce data system, particularly for MH.

Therefore, the purpose of this study is to develop a framework-based, situational analysis of the Portuguese data system — including as compared to that of the USA — toward informing improvement recommendations and implications for MH, aiming:

Aim 1: To develop a conceptual framework of OT workforce supply, inclusive of MH indicators and a checklist for data collection.

Aim 2: To apply the developed framework to systematically a) identify public-domain data, data sources, or lack of data on the OT and MH OT workforce supply in Portugal, as well as b) collect data on the framework and checklist usage through this initial beta testing of the framework and checklist.

Aim 3: To develop a situational analysis of the Portuguese OT workforce data system, using the SWOT template, including as informed by a comparison with the USA.

2. State of the Art

Access to rehabilitation and health services is marked by persistent inequities that disproportionately affect persons with disabilities. As noted, "paradoxically, people most in need of good health care often have the least access to it" (Bohanna et al., 2022). This situation reflects a longstanding reality in which "persons with disabilities over the world have persistently faced barriers to their full inclusion and participation in the life of their communities" (United Nations (UN), 2024). Despite the global necessity to meet rehabilitation needs, access remains limited: "people with disabilities face challenges accessing basic rehabilitation health care. There is global necessity to meet the rehabilitation needs of people with disabilities, but this goal is often challenged by the undersupply and inequitable distribution of rehabilitation workers" (Jesus et al., 2017).

Demographic and epidemiological changes are intensifying this challenge. The prevalence of disability is expected to rise, both due to population ageing and the so-called "epidemic of survival," as medical advances increasingly transform formerly life-threatening conditions into chronic or disabling ones (Oeffinger et al., 1998; Prince et al., 2015a; Vos et al., 2012a; WHO, 2011). Disability is therefore no longer a marginal issue but an expanding public health concern (Iezzoni, 2014; McDonald & Raymaker, 2013). This demographic shift directly impacts rehabilitation demand: "given increased life expectancy, global ageing of the population, and rising rates of chronic and non-communicable conditions, the growing population need for OTs is likely to continue to increase over time" (Jesus et al., 2025). More broadly, "the demand for rehabilitation is rising in tandem with the growing burden of disability related to chronic conditions, driven largely by improvements in management of acute medical conditions and the aging of the population" (Jesus et al., 2016b; Murray et al., 2012; Prince et al., 2015b; Vos et al., 2012b).

Yet supply, distribution and access remain critically uneven. Health disparities, inequitable access to health promotion and health care, and increased preventable risks of chronic conditions continue to produce poor outcomes for socially vulnerable populations (Horner-Johnson et al., 2014; Iezzoni, 2011; Stillman et al., 2014; WHO, 2011). Workforce shortages are aggravated by geographic maldistribution: "existing rehabilitation services and workers concentrate in urban locations and are not accessible to numerous people with disabilities living in rural settings" (Ayres et al., 2025; Jesus et al., 2017b; Landry et al., 2007; Wilson et al., 2009). These inequalities manifest both across and within countries, creating "within-

country rural and other geographic maldistributions" (Ayres et al., 2025; Smith et al., 2008). Access barriers in rural and remote areas have been documented not only in low- and middle-income countries but also in high-income contexts such as the United States (Landry et al., 2009; Wilson et al., 2009), Canada (Hill et al., 2017, 2017; Tran et al., 2008), and Australia (Dew et al., 2013; Gallego et al., 2015; Jesus et al., 2017c; Roots & Li, 2013). As a result, coverage gaps consistently affect people with disabilities living in rural, remote or underserved areas, exacerbating their risks of exclusion and poor health outcomes.

These inequities are not only a matter of service delivery but also of social justice, health equity and human rights. At the global level, universal health coverage – often described as "a commitment of Member States of the United Nations and a Sustainable Development Goal frequently seen as an 'ultimate expression of fairness'" (Campbell et al., 2013; Jesus et al., 2017a)- cannot be achieved without explicitly including rehabilitation supply, distribution, demand and needs, including those related to mental health. The persistent absence of timely, reliable, and actionable health data in many countries compounds these problems. Without such data stakeholders (e.g. researchers, policy makers, community advocates) are unable to make informed decisions about where to target resources to improve health outcomes and ensure that people live longer, healthier, and more productive lives.

2.1 Health Services Research and Translational Science

HSR has emerged as a critical interdisciplinary field dedicated to understanding how health care is accessed, delivered, financed, and evaluated. Its central aims include assessing the quality, efficiency, and cost-effectiveness of health care, with the ultimate goal of informing improvements in individual and population health outcomes. By documenting deficiencies in health care provision and identifying contributing factors, HSR provides the evidence base needed to strengthen health systems and guide policy and practice (Issues et al., 1994; Slade et al., 2020).Defined as an applied and multidisciplinary field, HSR integrates theories, methods, and knowledge from multiple disciplines, focusing on individuals, families, organizations, institutions, communities, and populations as domains of investigation (Issues et al., 1994; Kane et al., 2016).

At its core, HSR examines how people access health care, the costs of care, and the outcomes that result from it, seeking the most effective models for organizing and

delivering high-quality services (Hand et al., 2022; Issues et al., 1994). This includes evaluating the complexities of financing systems, organizational structures, social determinants, health technologies, and behaviors that collectively influence service provision. As a result, HSR not only provides insight into the functioning of health care systems but also supports government officials, insurers, providers, and consumers in making evidence-based decisions on health-related issues. Its overarching purpose is to generate knowledge that leads to measurable improvements in health at both individual and population levels (Barton, 2009; Institute of Medicine, 1991).

Within OT, HSR offers a particularly valuable approach to demonstrating the impact of the profession in contemporary health care systems. The growing emphasis on value-based care and reimbursement models makes research on access, effectiveness, and cost outcomes increasingly urgent, situating OT within broader conversations about system efficiency and client-centered value (Hand et al., 2022). Evidence generated by HSR is also instrumental in highlighting deficiencies in workforce supply, such as the historic undervaluing of human resources for health. Prior to 2000, health workforce data were scarce and fragmented, with health workers often regarded as recurring costs rather than strategic assets. More recently, however, Human Resources for Health Information Systems (HRHIS) have been prioritized as essential tools for analyzing and sustaining the workforce, supported by improved data sources, global frameworks and recommendations for action (Kuhlmann et al., 2018; McQuide et al., 2023).

Closely related to HSR is the field of Translational Research (TR), which focuses on bridging the gap between new knowledge and its practical application in health care delivery and policy (Cook et al., 2025). The National Institutes of Health (NIH) defines four stages of translational research: Type 1 (T1), which moves basic scientific discoveries into early clinical application; Type 2 (T2), which adapts promising clinical research into broader community settings; Type 3 (T3), which centers on dissemination and implementation research in real-world practice; and Type 4 (T4), which employs policy research to scale innovations through governance and health policy measures (Briody et al., 2024; Mensah et al., 2015; Mulnard, 2011). While T1 and T2 dominate early-phase translation, T3 and T4 are particularly aligned with the aims of this dissertation. T3 seeks to extend research into the realities of health care practice and services, identifying barriers and gaps in care

delivery, while T4 emphasizes the role of policy development, evaluation, and system-level change (Mulnard, 2011; Vukotich, 2016).

In this way, HSR and TR provide complementary lenses for this study. While HSR offers the frameworks, methods, and evidence base for examining the Portuguese OT workforce data system, particularly for MH, T3 and T4 TR situate this effort within a broader process of implementation and policy translation. Together, they support a research trajectory that moves beyond descriptive analysis to actionable recommendations, aiming ultimately to inform policy and strengthen systems for equitable and effective rehabilitation service provision.

2.2 Health and Rehabilitation Workforce Research

Health workforce research provides a critical evidence base for understanding the dynamics of supply, distribution, and policy impact. It has been emphasized that it "can identify supply shortages, either current or forecasted, investigate inequitable human resources distributions, and study the impact of workforce policies, management, and regulations on human resources recruitment, retention, resilience, and performance" (Galderisi et al., 2015; GBD, 2022; Krupa et al., 2009; Sedgwick et al., 2007). Within this broader field, Human Resources for Health (HRH) accounts "all people engaged in actions whose primary aim is to enhance health," and are considered a key building block of health systems (Jesus, Castellini, et al., 2022). The rehabilitation workforce is a particularly pressing area of need, given the global shortages and inequitable distributions documented across professions and regions.

The rehabilitation workforce comprises a wide range of professions, including physicians, physical therapists (PTs), OTs, speech-language pathologists (SLPs), prosthetic and orthotic practitioners, and PT/OT assistants, among others (Jesus et al., 2017). However, the composition, practices, competencies and skills of these workers are far from uniform. "Heterogeneity composition, practices, education and competencies ... often vary widely across countries, and even within the same country" (Gupta et al., 2011b; Jesus et al., 2016b, 2017b). Furthermore, "terminologies used to describe the same profession" are inconsistent, while "competencies, education, credentials and typical practices also vary within and across countries or practice locations, for the same profession" (Gupta et al., 2011b; Jesus et al., 2017a; WHO, 2011). As example, this heterogeneity can be verified on

educational pathways: while three-year clinical doctorates are increasingly required for PTs and OTs in the United States, practitioners in other contexts may work with lower-level credentials (Brown et al., 2015; Jesus et al., 2017a) . In addition, higher-skilled professionals often delegate routine tasks to PT/OT assistants, introducing further diversity in workforce roles (Jesus et al., 2016b; Stute et al., 2014). Rehabilitation workers are also deployed across multiple sectors—health, social care, and education—which complicates workforce monitoring and planning (Jesus et al., 2017a; WHO, 2011).

The consequences of these disparities are multifaceted. In contexts where demand far exceeds supply, cross-disciplinary assimilation of practices becomes more common, with professionals taking on roles traditionally performed by others(Jesus et al., 2016a, 2017b; Ward et al., 2023). Despite human resources (i.e. on health and rehabilitation) growing relevance, "the workforce has often been neglected within mainstream health-workforce developments" (Jesus et al., 2024). Existing approaches to estimating supply requirements are inconsistent, drawing variously on population size (Landry et al., 2009; WFOT, 2021), epidemiological indicators such as ageing and disease prevalence (Gupta et al., 2011b; Jesus et al., 2017b), or demand indicators like service utilization and unfilled vacancies (Al-Senani et al., 2019; Jesus et al., 2017b; Powell et al., 2008). This lack of standardization has produced fragmented evidence, with "rehabilitation workforce literature commonly report[ing] important limitations in the supply data sources" (Boniol et al., 2022; Gupta et al., 2011b; Kuhlmann et al., 2018; WFOT, 2020; WHO, 2023; Zimbelman et al., 2010). Accordingly, "substantial needs-based shortages of rehabilitation workers are documented and projected in many places around the globe" (Bo et al., 2008; Gupta et al., 2011b; Sykes et al., 2014; WFOT, 2020).

A critical methodological challenge lies in monitoring supply and distribution requirements in ways that account for both need and demand. While many studies stop at population size (Jesus et al., 2017b; Landry et al., 2007, 2009), more comprehensive approaches incorporate epidemiological indicators (Gupta et al., 2011; Jesus et al., 2016; Zimbelman et al., 2010) or demand measures (Bo et al., 2008; Landry et al., 2016; Powell et al., 2008). Nevertheless, there remains a need for global consensus on standard methods to assess supply and distribution requirements (Jesus et al., 2017). Similarly, "supply data sources" are often undermined by the lack of accurate, reliable, comprehensive, disaggregated, and comparable information (Gupta et al., 2011; Jesus et al., 2017b). Structural improvements are

therefore essential: monitoring the rehabilitation workforce requires stronger investments in data systems, including minimum dataset establlishments and practitioner registration (i.e. to ensure consistent national data collection). It also depends on the use of clear professional definitions, classifications, and credentials, as well as aggregated workforce data that is not grouped with other occupational groups. Moreover, to enable meaningful international comparisons and systems, definitions and classifications should be standardized across countries (Jesus et al., 2017).

Beyond sheer numbers, comprehensive workforce assessments should consider sectoral distribution (i.e public vs. private; health, social or educational), the care continuum (i.e. primary, acute, post-acute, long-term), and practice settings (i.e. inpatient, outpatient, home-based, community-based) (Costa et al., 2012; Jesus et al., 2016; Landry et al., 2012; Tran et al., 2012). To support such monitoring, a series of frameworks and tools have been developed. At the global level, the World Health Organization's National Health Workforce Accounts (NHWA) provide a cross-national framework for systematic data collection, already implemented across multiple income settings (Jesus et al., 2024; WHO, 2023). Complementarily, the World Health Organization (WHO) Guide for Rehabilitation Workforce Evaluation offers a cross-professional tool designed to strengthen the quality and reliability of rehabilitation workforce data (Jesus et al., 2023, 2024).

Within OT specifically, the World Federation of Occupational Therapists (WFOT) has advanced a global workforce strategy that includes the Workforce Hub, "an open access, online repository" hosting resources ranging from policy statements and datasets to toolkits, case studies, and best practices (Jesus et al., 2025; WFOT, 2024). In addition, methodological approaches such as situational analysis and Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis have been adapted from HSR and organizational strategy to workforce studies. Situational analysis has been used to produce global rehabilitation need estimates (Cieza et al., 2020), to inform MH planning (Murphy et al., 2019; Petersen et al., 2009), and to assess service implementation (Shakya et al., 2024). SWOT analysis, though originally from the business sector, has similarly been applied to rehabilitation workforce (e.g. including physiotherapy and nursing) (Houben et al., 1999; Macpherson et al., 2013; Manzano-García & Ayala-Calvo, 2014; Uhrenfeldt et al., 2014). Temporal and spatial analyses have also been applied in studies of HRH (Sixel et al., 2024),

highlight the role of geospatial mapping approaches in understanding workforce distribution and planning.

Together, these approaches underline both the importance and the complexity of rehabilitation workforce research. Despite increasing global recognition, significant challenges remain in standardizing definitions, improving data quality, and developing analytical tools that can adequately capture supply, demand, and distribution across professions, sectors, and geographies.

2.3 Occupational Therapy Workforce in Global Context

Within the broader field of rehabilitation workforce research, OT workforce represents a critical, yet often underexamined component, requiring focused attention to its global supply, distribution, and role in meeting population needs. To do it so, OTs must be available in adequate supply, equitably distributed across geographies and service areas, and able to meet competency standards (Jesus, Mani, Bhattacharjya, et al., 2023; Jesus, Mani, Von Zweck, et al., 2023). OT workforce research is fundamental in supporting these goals, as it provides evidence to inform supply requirements, workforce planning, and competency development. OTs work across diverse health, social, educational, and vocational settings with the shared aim of addressing the health and occupational needs of populations (Hocking et al., 2022; Jesus et al., 2024). Their scope encompasses the promotion of participation in occupations that bring value and meaning to life, particularly for individuals and communities at risk of or experiencing physical, mental, developmental, and other impairments (Hocking et al., 2022; Jesus et al., 2025). In this sense, OTs not only contribute to rehabilitation but also to health promotion, well-being, human rights, and the mitigation of occupational injustices arising from socio-environmental factors (Bailliard et al., 2020; Reitz & Scaffa, 2020).

Despite the rising demand for rehabilitation worldwide, fueled by global ageing, non-communicable conditions, and the growing burden of disability, the OT workforce remains underdeveloped and inequitably distributed (Jesus et al., 2024; Jesus, Landry, & Hoenig, 2019). Shortages occur both between countries of varying income levels and within nations, where imbalances exist across geographic areas (i.e., rural vs. urban), service sectors (e.g., public vs. private), and health domains (e.g. MH, physical rehabilitation) (Jesus, Mani, von Zweck, et al., 2022). These inequities are particularly concerning given that OTs are critical

for meeting the health, rehabilitation, and occupational needs of the population, particularly for MH (Jesus et al., 2023).

Reliable data is essential for identifying workforce gaps, accurate assessment and monitoring development, as well as informing policy, yet "knowing the status of the occupational therapy workforce" remains challenging due to persistent data limitations (Jesus et al., 2024). OTs are classified in the International Standard Classification of Occupations (ISCO) under "Health Professionals Not Elsewhere Classified," a nonspecific categorization that restricts systematic data collection and hinders workforce planning (Jesus et al., 2025; von Zweck et al., 2017). Unlike medical doctors, nurses, midwives, dentists, SLPs, psychologists, PTs and other health professions, OTs are often not accounted for in major international workforce databases, or their data are aggregated with unrelated professions (Boniol et al., 2022; Haakenstad et al., 2022; Jesus et al., 2023). As a result, although international OT associations have been gathering information provided by their national member bodies, there are barely any dedicated, standardized data sources, nor clear national-level reporting procedures for OT workforce data (Jesus et al., 2017).

The WFOT Global Strategy for the OT Workforce, a "global, overarching framework that articulates key strategic directions and domains for the assessment and strengthening of the OT workforce at local, national, and cross-national levels", explicitly acknowledges these data gaps and calls for the establishment of a coherent, international framework for OT workforce data collection. The strategy outlines seven major strategic directions (Supplementary Material 1), beginning with strengthening OT workforce data systems through the definition of minimum and supplemental datasets, standardized reporting procedures, and international alignment (Jesus et al., 2024). Long-term objectives include enabling WFOT member organizations to compile national workforce data in line with international standards, ensuring the provision of complete and reliable information for both national and international monitoring initiatives such as the WFOT Human Resources Project (WFOT, 2024b), and using data to identify workforce imbalances and inform targeted development plans. Furthermore, the strategy emphasizes the need for mechanisms capable of systematically collecting, integrating, and comparing disaggregated workforce data across countries and jurisdictions (Jesus et al., 2024).

Nevertheless, significant challenges remain. OT workforce data are often fragmented and scattered (i.e., when available) across registration/licensure bodies, immigration agencies, census organizations, and employer databases (Jesus et al., 2024). Employment-related information, such as attrition rates, turnover, or mobility, is sparse, while administrative data are typically aggregated, incomplete, or outdated (Boniol et al., 2022; Jesus et al., 2023; Jesus, Mani, et al., 2022; Jesus et al., 2022). Research into the OT workforce itself is still limited, characterized by little year-to-year growth, overreliance on small cross-sectional studies, lack of longitudinal evidence, non-representative sampling, and scarce use of standardized data collection frameworks (Jesus et al., 2023). Together, these issues severely restrict the ability of policymakers and workforce planners to monitor progress and to design responsive, evidence-based interventions for strengthening the OT workforce at national and international levels.

2.4 Occupational Therapy in Mental Health, Global and National Contexts

Building on the overview of the OT workforce, it is equally important to examine how OTs contribute specifically within MH, where their practice emphasizes supporting individuals to participate meaningfully in daily activities—such as education, leisure, and work—particularly when participation is compromised by health conditions, including those affecting MH (Jesus et al., 2025). Mental disorders remain a leading contributor to global ill and incapacity: data from the Global Burden of Disease (GBD) study consistently show that MH pathologies are among the top causes of illness worldwide and are the leading cause of global non-fatal disease burden (GBD, 2022).

In Portugal, the situation is especially concerning. According to GBD estimates (Supplementary Material 2), Portugal has the highest age-standardized prevalence of mental disorders per 100,000 people in the world (Liu et al., 2025; Prince et al., 2015a). This challenge is compounded by the country's demographic and epidemiological profile: Portugal is one of the oldest nations globally, with a rapidly ageing population and high burdens of chronic disease, including for MH and other pathologies linked to it (e.g.m, dementia). Rising prevalence in pediatric or geriatric psychiatry populations further adds to the pressure. Together, these factors drive increased demand for rehabilitation and OT services. Without robust data systems to monitor supply and distribution, there is no

guarantee that OT workforce capacity will be able to equitably deliver services across geographies or adapt sustainably to future population needs.

OTs have a long history of contributing to MH services, promoting recovery and positive MH by enabling individuals and communities to (re-)engage in meaningful activities (Boop et al., 2020; García-Gestal et al., 2024; Read et al., 2024; Sedgwick et al., 2007; Shepherd et al., 2025). Yet, despite their relevance, OTs remain under-represented in MH practice (Jesus et al., 2023). WFOT's biennial workforce monitoring has consistently shown that MH is the practice area with the highest vacancy rates worldwide over the past two decades (Jesus et al., 2025a, 2025b). Even in high income and resources contexts, underrepresentation persists (e.g., in the USA, only 2.2% of the OT workforce is employed in MH, representing just 0.2% of the non-physician MH workforce) (AOTA, 2019; Jesus et al., 2025a). Advancing the supply of OTs in MH could help alleviate broader workforce shortages in this field (Jesus et al., 2019; Keptner et al., 2024; Read et al., 2024).

Portugal illustrates these global challenges acutely. Unlike other countries that have begun to implement workforce data systems, as currently lacks dedicated mechanisms for collecting, analyzing, and mapping OT workforce data for MH and for the profession. No system exists to assess geographic, rural/urban, or regional disparities in supply and utilization of OT services. This absence is partly due to structural weaknesses in the national data infrastructure, which impede systematic monitoring of the OT workforce compared to international standards. As a result, stakeolders (i.e. policymakers, researchers, community advocates) lack the information required to align workforce distribution with population MH needs.

The supply-demand imbalance in OT is not unique to Portugal. Global evidence shows that shortages exist across income levels, even when adjusting for population size, needs, and socio-economic and demographic factors (Jesus, Landry, et al., 2022). Effective workforce planning requires more than simply gathering data; it requires aligning workforce data with labor market analyses, service utilization trends, and population health demands to identify supply gaps (Jesus et al., 2024). Strengthening data infrastructure is therefore a prerequisite for sustainable planning, both in Portugal and worldwide (Gupta et al., 2011a; Roberfroid et al., 2009).

Evidence from the WFOT Human Resources Project highlights the scale of the challenge: 31% of member organizations report shortages of OTs in funded MH positions (WFOT,

2024b). Barriers identified in global surveys include long waiting times, inadequate funding, high intervention costs, and insufficient therapist availability (Jesus et al., 2025b). These findings resonate with broader MH system issues: persistent stigma, limited access to affordable services, underinvestment, and weak monitoring mechanisms (Saxena & Kline, 2021). Globally, government expenditure on MH remains grossly inadequate, with a median of just 2.1% of health budgets allocated (Saxena & Kline, 2021). Calls from the Lancet Commission and others emphasize raising investment to at least 10% of total health spending in high-income countries (Patel et al., 2018).

Economic pressures further complicate this picture. Periods of recession are associated with higher prevalence of common MH disorders, substance abuse and suicide, as well as health workforce shortages (Correia et al., 2017; Frasquilho et al., 2016; Jesus et al., 2019). These dynamics underscore the importance of timely and representative workforce data as an early-warning system to anticipate rising needs and maintain adequate supply.

Gegarding spatial characteristics and data, Portugal provides a striking example of how regional differences in population needs require equally nuanced workforce responses. Studies on dementia prevalence show wide geographic variation: 2.7% in Northern Portugal rural/urban populations (Nunes et al., 2010), 1.3% in Oporto (Ruano et al., 2019), and 9.5% in a Southern community sample (Gonçalves-Pereira et al., 2017). These variations illustrate the necessity of equitable workforce supply distribution, inclusive of MH OTs, to ensure that services match regional needs. Without a robust data system, such disparities cannot be identified, let alone addressed.

Ultimately, data are a powerful tool to drive action in MH and workforce development. Yet persistent gaps, absence of agreed indicators, and lack of accountability mechanisms limit their potential (Saxena & Kline, 2021). Having timely, good-quality, representative data is essential not only for decision-making but also for holding governments accountable, driving policy change, and making the case for increased investment (Saxena & Kline, 2021). For OT specifically, literature points to the need for legal recognition, advocacy, and funding reforms to reinforce MH OTs as qualified and reimbursable providers in MH systems (Jesus et al., 2025).

By linking the structural inequities and knowledge gaps identified in the state of the art with the specific Portuguese context, this dissertation contributes to a growing body of HSR. The intention is not merely descriptive but generative: to propose a pilot systematic framework

capable of both highlighting deficiencies in current workforce data systems and guiding the steps needed to strengthen them, thereby advancing the rehabilitation agenda in line with global health equity goals.

3. Methods

The methodological approach adopted in this study was designed to achieve the stated purpose of developing a framework-based situational analysis of the Portuguese OT workforce data system, toward informing recommendations for OT MH and systems improvement. This incorporates HSR, based on secondary analysis of public-domain data, thereby no human subject research was conducted. This aligns with standard practice for secondary data analysis where no ethical approval is required (Jesus et al., 2016a, 2017b, 2025b). The methodology was structured around three sequential and complementary steps, each corresponding to one of the study's aims.

First, a conceptual framework of OT workforce supply inclusive of MH indicators was developed, accompanied by a structured checklist to guide data collection (Aim 1). This step established the theoretical and operational foundations for the study, drawing on existing workforce models, literature, and global health strategies.

Second, the framework was applied to the Portuguese context in order to systematically identify OT and MH OT workforce supply and distribution public-domain data sources, assess data availability and gaps, and conduct an initial pilot testing of the framework and checklist (Aim 2). This step enabled the generation of a structured dataset while also informing refinement of the framework's usability and applicability.

Finally, a SWOT analysis was conducted to provide a situational assessment of the Portuguese OT workforce data system (Aim 3). This analytic step focused on identifying system-level strengths, weaknesses, opportunities, and threats, and on positioning these findings within the broader challenges of workforce data availability, completeness, and utility. Together, these three methodological steps provided a coherent and systematic approach for advancing the understanding of OT workforce data systems, inclusive for MH, and for supporting evidence-based recommendations for their improvement.

3.1 Development of the Conceptual Framework and Checklist

The first step of the methodological process was the development of a conceptual framework for the situational assessment of the OT and MH OT workforce supply data system, inclusive of a structured checklist for data collection, and began with the identification of key workforce characteristics alongside relevant features of data systems to be incorporated into the framework. This methodological approach was informed by the study conducted by Jesus et al. (2016), which investigated the "right-size physical therapy workforce." That study was grounded in an a priori theoretical elaboration of the complex interplay among variables that influence workforce needs, and it provided an important precedent for adapting a similarly structured framework to the OT context (Jesus et al., 2016a).

To support this process, a targeted review of the literature was carried out with the objective of identifying and analyzing existing frameworks, models, and empirical studies that addressed the interrelated domains relevant to workforce planning and supply assessment. Particular emphasis was placed on examining how variables and domains had been previously conceptualized, as well as on understanding the defining characteristics of workforce data systems. Searches were conducted across published and grey literature on studies, reports, framework models, and workforce-related initiatives. Keywords were combined in multiple configurations to maximize retrieval and included: *framework*, *workforce*, *human resources*, *research*, *strategy*, *assessment*, *services*, *planning*, *rehabilitation*, *health*, *occupational therapy*, *mental health*, *supply and distribution*, *utilization*, *needs*, *demand*, and *access*.

Primary searches were conducted using *PubMed* database as a personalized research tool, maintained by the *U.S. National Library of Medicine* (NLM) within the NIH (Jin et al., 2024; *PubMed*, n.d.). *Google Scholar* search engine was used for complementary broad research, including citation tracking and grey literature search (i.e., publishing from government academia or industry organizations, such as research institutions, universities, international, national and local authorities, e.g., WHO reports) (Bonato, 2016). *Research Rabbit* and *Semantic Scholar* were used for advanced AI-powered discovery: *ResearchRabbit* (Supplementary Material 3) is an AI-powered literature research tool that enhances comprehensive search, visualization tools used for understanding citation networks - which helps to identify interdisciplinary research and potential research gaps –

and to visualize how papers and authors connect over time through visual maps (*ResearchRabbit*, n.d.; Sharma et al., 2022). *Semantic Scholar* is an AI-powered semantic search that uses machine learning to understand meaning and context of queries, leading to precise search results and concise resumes, key figures and citation context to efficient assessment of research relevance (Kinney et al., 2023; Semantic Scholar, 2021). Secondary searches (citation-tracking, author-tracking, references consultation) were also performed.

Exclusion criteria were defined according to language (i.e., exclusion if not in English or Portuguese) and subject (i.e., framework models/concepts with no relevant connection to rehabilitation/health workforce). Search was conducted between January 2025 and September 2025. As for efficient collection and management of research materials, *Mendeley* was used as the primary tool for citation generation and bibliography organization, as well as to annotate PDFs and save notes within library folders (*Mendeley*, n.d.). *Microsoft Excel* was used to manage, systematize, visualize and analyze information and data extracted from literature, conceptual frameworks, reports and other information sources (Newman & Newman, 2007).

Multiple sources were found to be relevant for our framework's theoretical elaboration (Jesus et al., 2016b). O'Brien-Pallas proposed a workforce planning framework grounded in service utilization models and a health care quality framework, which conceptualizes how the health workforce may be structured to address population health needs (Birch et al., 2009; ACHDHR, 2007; O'Brien-Pallas et al., 2001). There are several health workforce development frameworks and activities that were consulted, both as informative material and source of reference. These include methodological frameworks and rehabilitation workforce development tools with similarities to this study (Jesus et al., 2016b, 2017a; Mills et al., 2021), global strategies – mainly from *WHO* – that provide guidance/strategies for health workforce research (McIsaac et al., 2024) and a profession-specific development guide (Ajuebor et al., 2019; Wilson et al., 2009) and a guidebook on health labour market analyses (WHO, 2021). Occupational classification systems (von Zweck et al., 2017) and publication or funding trends on health workforce literature (Jesus, Castellini, et al., 2022), were also consulted. *AAAQ Framework*, a tool used in healthcare to determine specific barriers that affect access to services, was also consulted. This framework establishes a four-criteria evaluation based on: Availability, Accessibility, Acceptability, and Quality

(Campbell et al., 2013). For this study, availability (operationally defined as the sufficient supply of health workers that corresponds to population needs) and accessibility (operationally defined as the equitable distribution of health workers) were considered.

Health workforce data systems tools and frameworks were also analyzed, mainly *WFOT Global Strategy for the Occupational Therapy Workforce*, which provides an overarching framework with key strategic directions for the strengthening of the OT workforce (Jesus et al., 2024; Jesus, Mani, Von Zweck, et al., 2023), Global databases for reporting health workforce data (*Health Workforce statistics database*, n.d.), and tools as NHWA, a *WHO*-sponsored framework with data requisites countries must define. NHWA also provides support to collect, analyze and use health workforce data, critical for HRHIS development and strengthening health systems by providing structured approach to health workforce management (WHO, 2023).

Variables and domains from identified sources were considered to reflect the complexity of the OT workforce, such as those related to: supply, distribution and workforce development (i.e. population adjusted OTs ratios, e.g. for current total workforce: registered vs employed and their distribution across geographic regions and sectors, new graduates per year and their distribution across geographic regions and sectors), population needs (i.e. antecedent demographic or epidemiological and functional data e.g. indicators from GBD), demand and access (i.e. requests for OT services, e.g. barriers to access, vacancies, job openings, unemployment rates, coverages, insurance data), deployment and utilization (e.g. # hours per service or profession nationwide, # hours per practice area or per public/private sector), OTs influx/efflux (e.g. emigration/immigration patterns) or scope of practice when compared to related rehabilitation professions (e.g. PTs, physicians, psychologists, nurses) (Gupta et al., 2011a; Jesus et al., 2016b; Ward et al., 2023; WHO, 2011).

3.2 Framework Checklist Application to the Portuguese OT Workforce Data System

The application of the framework followed a structured process intended to systematically map and assess available data sources on the Portuguese OT and MH specific workforce supply and distribution, focusing on its specifications and particular characteristics, mainly related to identification of public-domain supply data and data sources (i.e., whenever available) or even lack of data, at different levels, especially local and national as the focus.

The pilot application of the framework checklist was also designed to assess its structure and usability, with the aim of informing future refinement.

The process conducted was similar to previous Jesus et al. (2016) study, which used similar methodologies to develop/adapt conceptual frameworks and test those to collect and organize data on health workforce activities, literature, research and data (Jesus et al., 2016b).

Information sources (i.e., whenever available) were consulted to identify and populate the framework checklist items, according to conceptual domains and subdomains established: OT workforce supply, from which derived four domains (OT supply, Workforce Production, Workforce quality and OT workforce distribution, by practice area and sector (Nation)), and OT workforce distribution, from which derived one domain (Geographic distribution, mappable). Each data item/indicator from the framework checklist was populated with data on applicability to nation (if applicable), data source (if applicable, and detailed on whether public-domain available, type and name of source, update frequency and last year of data available), value (item or indicator) and limitations (both on data source and other limitations). Methods for aggregating/compute data from different sources were established to enable the derivation of values for items/indicators when primary data were not available.

The main sources consulted were identified through snowballing process and consist of national and international public-domain data sources, including national statistics databases such as Instituto Nacional de Estatística (INE) (*Portal do INE*, n.d.), responsible for Portuguese Census comprehensive data collection every 10 years (last update: 2021) (INE, 2022) and PORDATA (*PORDATA*, n.d.), that is an official statistics portal with data on Portugal, including geographically stratified data (i.e. municipal, regional, national and some European data indicators) or international statistics databases such Eurostat or NHWA Data Portal (*Eurostat*, n.d.; *NHWA Web portal*, n.d.). Relevant literature, institutional websites, databases and reports (e.g. World Bank Data, WFOT, Council of Occupational Therapists for the European Countries (COTEC), OECD, APTO) were also consulted (*APTO*, n.d.; *COTEC*, n.d.; *WFOT*, n.d.; *Rural Well-being*, 2008; *World Bank*, n.d.; WFOT, 2024). Portuguese institutional databases, platforms, websites and data portals regarding health and rehabilitation, human resources and workforce (e.g. Administração Central do Sistema de Saúde (ACSS), Entidade Reguladora da Saúde (ERS), Sistema Nacional de Saúde (SNS),

Direção Geral de Saúde (DGS)) were analysed (*ACSS*, n.d.; *DGS*, n.d.; *ERS*, n.d.; *SNS* , n.d.), as well as workforce production variables (i.e. data from educational sector, e.g. DGEEC, Portuguese Ministry of Education, education statistics database and reports such as Registo de Alunos Inscritos e Diplomados do Ensino Superior (RAIDES)) (*InfoCursos*, n.d.; *DGEEC*, n.d.).

3.3 SWOT Analysis of the Portuguese OT Workforce Data System

A SWOT analysis was undertaken to support the situational assessment of the Portuguese health workforce data system. The purpose of this analytical step was to identify which strengths and opportunities might be maximized, and which weaknesses and threats might be minimized, eliminated, or overcome, as well as recommendations for improvement. Derived from Jesus et al. (2023), Table 1 presents the general definitions of each SWOT category, distinguishing internal factors (Strengths and Weaknesses) from external factors (Opportunities and Threats) (Jesus, Mani, Bhattacharjya, et al., 2023).

Table 1. SWOT analysis concepts and associated general definition for each.

Concept	General Definition
Strenghts	Internal properties of the system or organization under study that represent a competitive advantage for that system or its own development
Weaknesses	Limitation internal to the system or organization under study that may hamper its progress
Opportunities	Any external environmental factor that may act as a facilitator to the progress of the system or organization under study
Threats	Any external environmental factor that may act as a barrier to the system or organization under study

Originally derived from the management and business literature (Houben et al., 1999), the SWOT framework was adapted for use in diverse fields, including healthcare and workforce research. Its application has proven to be valuable on identifying systemic challenges, contextual factors, and opportunities for development (Jesus et al., 2017a; Macpherson et al., 2013; Manzano-García & Ayala-Calvo, 2014; Uhrenfeldt et al., 2014). This methodology

enhanced the articulation of both internal dynamics and external influences, shaping workforce development and the design of policy recommendations.

In the present study, the SWOT framework was used not to evaluate the OT workforce supply per se, but rather to evaluate Portuguese OT in general and MH OT in specific workforce supply data system. Following the approach outlined in the WFOT Global Strategy (Jesus et al., 2024), the analysis was designed to highlight system-level strengths, weaknesses, opportunities, and threats, while situating them within the broader challenges of data availability, completeness, and utility over time (years, units, information). In this way, the SWOT analysis was intended to provide a context-sensitive situational assessment of the existing data infrastructure.

4 Results

The chapter is organized into three sections. Section 1 outlines the conceptual framework diagram and its operationalization into a checklist, translating constructs into measurable indicators. Section 2 presents the application of this checklist to the Portuguese OT workforce data system, highlighting available quantitative and geospatial data, as well as providing qualitative notes on limitations and critical gaps across OT supply, workforce production, quality, distribution, and geographic distribution. Section 3 synthesizes these findings through a SWOT analysis, summarizing internal strengths and weaknesses, and external opportunities and threats, focusing on the Portuguese data system information, granularity, integration, and geospatial mapping capacity for OT and OT MH workforce.

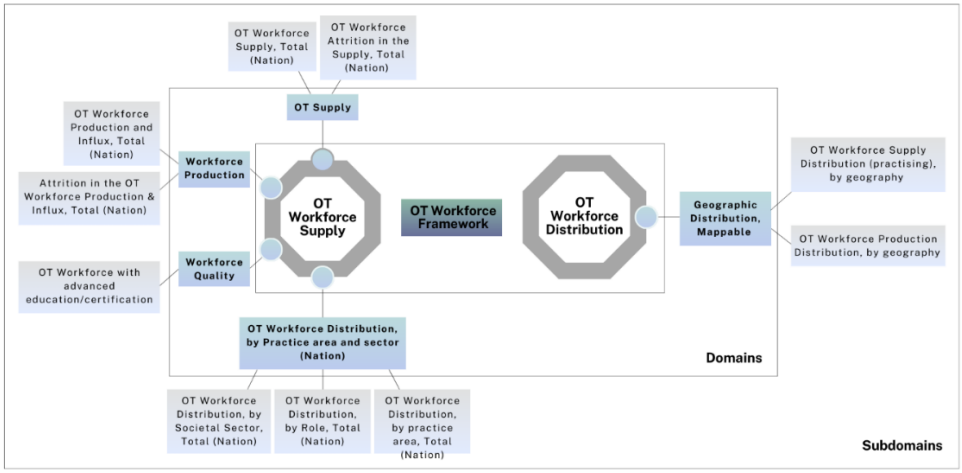
Together, these sections provide a structured, evidence-based overview of the Portuguese OT workforce data system and its capacity to support monitoring and planning.

4.1 Conceptual Framework and Operationalization into a Data Collection Checklist

This section presents the outcomes of aim one, that is to develop a conceptual framework for the situational assessment of OT workforce supply data systems, inclusive of OT MH indicators, pilot tested with Portuguese data system and to translate this framework into a structured checklist for data identification and collection. The goal was to operationalize the abstract constructs of the conceptual framework into a practical tool capable of guiding the systematic collection and evaluation of workforce data.

A conceptual framework was developed through drafting and editing iteratively, while grounded in the theoretical foundations described in the Methods section one, including prior models of health workforce planning and service utilization (e.g. Jesus et al., Donabedian, Andersen) and considering the complex intersection and relation among constructs. Variables were iteratively selected and organized. Initially, variables were aggregated into five categories: contextual country variables; supply and distribution; utilization; demand and access; population needs. Having OT workforce supply and distribution as the main scope of research, as it is frequently not studied with such profundity (Jesus et al., 2017c), categories were narrowed for further investigation and analysis, ensuring comprehensive coverage of both quantitative data and geographically mappable indicators, and following supply and distribution data elements highlighted by WFOT (Jesus et al., 2021, 2024; Jesus, Mani, Von Zweck, et al., 2023). Therefore, the framework was developed according to OT workforce-related variables, organized in two primary sections, each with domains and subdomains. The two primary sections are: *OT Workforce Supply* (i.e., quantitative/extractable data, if available) and *OT Workforce Distribution* (i.e., geographically mappable data). Whitin each section, there are domains and subdomains: *OT Workforce Supply* section has four domains (i.e., OT Supply, Workforce Production, Workforce Quality and OT Workforce Distribution, by Practice area and sector (Nation)), while *OT Workforce Distribution* section has one domain (Geographic Distribution, Mappable). Figure 1 illustrates the resulting conceptual model, highlighting the hierarchical structure among domains and subdomains. The framework serves as a theoretical scaffold for subsequent operationalization and application.

Figure 1. Conceptual Framework Developed for OT Workforce Supply and Distribution



Following the development of the conceptual framework, a structured checklist (table format) was derived to operationalize the abstract components into discrete, measurable items/indicators (Supplementary Material 4). The checklist follows the same organization of the conceptual framework, which consists of two sections from which domains and subdomains derive. Each conceptual subdomain comprises constructs (e.g., Total Stock (available for practice), Unemployment Rate, Graduates – yearly, private school, Immigration attrition, Professional Doctorate as entry level, Public Sector (Government-based), Mental Health, Assistive technology, Rural areas, all combined). For each construct developed, there is a self-explanatory item/indicator (e.g. OTs registered/ licensed/ legally available for practice (total), per 10,000 heads of population, OT unemployment rate (% of total OT workforce available), total # of nationally trained OT graduates in the last decade (e.g., yearly average), % of OTs in clinical practice that work in MH settings including pediatric and geriatric)). For every Item/indicator, the checklist provides a Country-level table to identify and collect the following data: Construct Applicable to Nation (Y/N) and Notes on: Construct Applicable, Data Source (if applicable) (Data Source(s) – public domain/accessible – Available (Y/N/P); Which data source(s): type and name, either alone or to be computed in combination; Notes (any): on the data sources and the need for combination/computing data; Update frequency/timing (e.g., continuous, yearly, every five years, never); Last year of data available), VALUE (item/ indicator) and Limitations (e.g. Data Source; qualitative; Other).

The checklist provides a systematic method to assess the availability, completeness, and comparability of OT workforce data across national and international contexts, as well as to identify geographically mappable data within a country.

The iterative refinement process through multiple cycles of review and editing to narrow the focus to supply and distribution dimensions was critical for theoretical alignment of both the conceptual framework and the operational checklist. This process ensured that the checklist reflects both theoretical rigor and practical utility, capturing the complex characteristics of OT workforce supply while facilitating consistent and reproducible data collection.

4.2 Application of the Framework Checklist to the Portuguese OT Workforce Data System

This section presents results focused on the pilot application of the conceptual framework and checklist to the Portuguese OT and MH OT workforce supply data system with the objective of testing the usability of these products to systematically identify public-domain data, data sources or data gaps.

The results are presented according to the same structure as the conceptual framework and checklist: OT Workforce Supply (quantitative/extractable data, if available) and OT Workforce Distribution (geographically mappable data). Within each domain, results are further organized by subdomains: OT Workforce Supply includes OT Supply, Workforce Production, Workforce Quality, and OT Workforce Distribution by Practice area and sector (Nation), while OT Workforce Distribution includes Geographic Distribution, Mappable.

Supplementary Material 5 presents the framework checklist applied to the Portuguese OT workforce supply data system. It presents each domain, subdomain, and associated indicators, alongside available data sources, computed values and qualitative data on limitations.

Domain: OT Supply

Subdomain: OT Workforce Supply, Total (Nation)

- Total Stock (available for practice): The Portuguese OT workforce comprises 2,880 registered/licensed OTs (Jesus, Roldão, Pinto, et al., 2023; WFOT, 2024), representing 2.68 OTs per 10,000 inhabitants. Population estimates were based on INE and PORDATA data (10,749,635 inhabitants, 2024). Limitations include irregular updates, reliance on Associação Portuguesa de Terapeutas Ocupacionais (APTO) report based on national survey volunteering participation, and lack of fully institutionalized registry.

- Total Practising / Self-Employed OT (count): Approximately 966 OTs answered APTO national survey (being the main data source available on practising OTs) (Jesus, Roldão, Pinto, et al., 2023), equating to 0.85 per 10,000 inhabitants.

- Total practising / (Self-)Employed OT (full-time equivalents): No public-domain data available.

Subdomain: OT Workforce Attrition in the Supply, Total (Nation)

- Unemployment Rate: Estimated at 2.1% of the OT workforce, based in APTO report (2023) (Jesus, Roldão, Pinto, et al., 2023).
- Career Switches: Approximately 1.2% of OTs reported practicing in other fields, according to APTO report estimates (Jesus, Roldão, Pinto, et al., 2023).
- No full-time practice, external migration and retirement rates (historical and planned): indicators could not be reliably computed due to lack of disaggregated or public-domain data.

Domain: Workforce Production

Subdomain: OT Workforce Production and Influx, Total (Nation)

- Graduates – yearly, total: On average, 125 OTs graduated annually in Portugal over the last decade, based on RAIDES survey data (Supplementary Material 6)(*DGEEC*, 2022).
- Graduates – yearly, public vs private schools: Public schools contributed 100 graduates/year and private schools 25 graduates/year, on average, according to data from RAIDES Survey (*DGEEC*, 2022).
- Graduates from WFOT-approved programs: 100% graduates/year came from WFOT-approved programs (Portugal has four approved programs and five graduation programs in total, but the non-approved program first graduates' data are subsequent to this decade data span) (WFOT, n.d.).
- Immigration – yearly, total: Data missing, limiting estimates.

Subdomain: Attrition in the OT Workforce Production & Influx, Total (Nation)

- Graduation Attrition / Unfilled training spots / Immigration attrition: No public-domain data available on this subdomain items/indicators.

Domain: Workforce Quality

Subdomain: OT workforce with advanced education/certification

- Master-level education (above entry-level): 20% of OTs reported holding a master-level degree, based on APTO report on national survey (Jesus et al., 2023).
- PhD-level education: 2.8% of OTs reported PhD attainment, according to APTO report on national survey (Jesus et al., 2023).

- Advanced specialization/certification: Only 0.1% of OTs reported having formally recognized advanced specialization.
- Professional Doctorate (above entry level) / Master as entry level / Professional Doctorate as entry level: Framework checklist indicators not applicable to Portugal

Domain: OT Workforce Distribution by Practice Area and Sector (Nation)

Subdomain: OT Workforce Distribution, by Societal Sector, Total (Nation)

- Public Sector (Government-based): Estimated at 45% of the OT workforce, based on WFOT Human Resources Project Dashboard (WFOT, 2024b).
- Private Sector (for profit): Estimated at 55% of the OT workforce, based on WFOT Human Resources Project Dashboard (WFOT, 2024b).
- Public Sector (Local or municipality) / Industry / NGOs, social, not-for-profit: No public-domain data available/stratified for OT.

Subdomain: OT Workforce Distribution, by Role, Total (Nation)

- Scholar/academia (researcher, educator): Estimated at 1.45% of the OT workforce that participated on the APTO survey, based on APTO report (2023) (Jesus et al., 2023).
- Practitioner (clinician, school-based OT), excluding self-employed / Self-employed/entrepreneur / Managerial/Administrative: No public-domain data available for OT.

Subdomain: OT Workforce Distribution, by practice area, Total (Nation)

- Mental Health: Estimated at 8.39% of the OT workforce that participated in the APTO survey, based on APTO report (2023) (Jesus et al., 2023).
- Physical Rehabilitation, post-acute or long-term: Estimated at 25.16% of the OT workforce that participated on the APTO survey, based on APTO report (2023) (Jesus et al., 2023).
- Geriatric, not health system: Estimated at 10.56% of the OT workforce that participated in the APTO survey, based on APTO report (2023) (Jesus et al., 2023).

- Pediatric – healthcare (not school based, not social/educational): Estimated at 10.97% of the OT workforce that participated in the APTO survey, based on APTO report (2023) (Jesus et al., 2023).
- School-based or learning disabilities: Estimated at 32.19% of the OT workforce that participated in the APTO survey, based on APTO report (2023) (Jesus et al., 2023).
- Acute care: Estimated at 10.97% of the OT workforce that participated in the APTO survey, based on APTO report (2023) (Jesus et al., 2023).
- Adult Intellectual/Development Disabilities: No public-domain data available/reported.
- Assistive technology: Estimated at 0.21% of the OT workforce that participated in the APTO survey, based on APTO report (2023) (Jesus et al., 2023).
- Community-based: Estimated at 2.48% of the OT workforce that participated in the APTO survey, based on APTO report (2023) (Jesus et al., 2023).
- Other or Emergent areas: Estimated at 6.31% of the OT workforce that participated in the APTO survey, based on APTO report (2023). Predominantly roles reported were on primary care, home intervention and prisons (Jesus et al., 2023).

Domain: Geographic Distribution (Mappable):

Subdomain: OT Workforce Supply Distribution (practising), by geography

- Large Region, State, or Regional Aggregation of States: Estimates based on APTO Survey Report (2023) data collected on OTs working province/district location (Jesus et al., 2023). Granular data can be grouped into large regions.
- Province/District: Estimates based on APTO Survey Report (2023) data collected on OTs working province/district location (Jesus et al., 2023).
- County Level / Rural areas, all combined / Rural areas, each / Underserved (Formal designation), all combined / Underserved (Formal designation), each: No mappable public-domain data (raw or to be computed) found.

Subdomain: OT Workforce Production Distribution, by geography

- Graduation, by large region, state of aggregation of states: Estimates based on granular data from academic institution province/district location informed by

RAIDES Survey, grouped into large regions, and crossed with Portuguese administrative regions. Then, combined with population data by region per year (INE / PORDATA) to compute per 10,000 heads of population per region (*DGEEC*, 2022; *PORDATA*, n.d.; *Portal do INE*, n.d.).

- Graduation, Province/District: Estimates based on granular data from academic institution province/district location informed by RAIDES Survey and crossed with Portuguese administrative regions. Then, combined with population data by region per year (INE / PORDATA) to compute per 10,000 heads of population per region (*DGEEC*, 2022; *PORDATA*, n.d.; *Portal do INE*, n.d.).
- Graduation attrition, by large region, state of aggregation of states / Graduation attrition, by Province/District / Unfilled training spots (public), by large region, state of aggregation of states / Unfilled training spots (public), by Province/District: No mappable public-domain data (raw or to be computed) found.

In addition to the quantitative indicators presented above, qualitative notes extracted from the checklist application provide further insight into the usability of the framework and the limitations of the available Portuguese OT workforce data system:

Domain: OT Supply

Subdomain: OT Workforce Supply, Total (Nation)

The checklist application revealed that data sources are irregularly updated, with WFOT figures dependent on member association submissions, which may lag behind actual workforce numbers. APTO-reported estimates rely heavily on voluntary survey participation, limiting representativeness, and are further based on ACSS figures for registered/licensed OTs, which do not capture the complete number of OTs in Portugal. In addition, no institutionalized, public-domain registry was identified for OT data in general, nor for MH in particular.

Subdomain: OT Workforce Attrition in the Supply, Total (Nation)

Available data is similarly constrained by dependence on voluntary survey responses, with no disaggregated or institutional data systems found. The lack of updated figures prevents reliable computation across indicators (for example, relating practising and total stock), while existing reports provide only fragmented and self-reported accounts of retirement patterns rather than structured, quantitative indicators. Data on migration and other

attrition pathways are not available for OT specifically, resulting in an absence of reliable quantitative evidence for these items.

Domain: Workforce Production

Subdomain: OT Workforce Production and Influx, Total (Nation)

RAIDES survey data are available but are often aggregated, limiting detailed year-by-year analysis. Portuguese OT programs were approved by WFOT at various times, resulting in scattered comparability across years. Data specific to OT remain limited, as immigration statistics and other relevant indicators are not disaggregated by profession. While universities may hold stratified data on OT graduates, such figures are not public-domain or aggregated nationally.

Subdomain: Attrition in the OT Workforce Production & Influx, Total (Nation)

Data are fragmented and inconsistently reported, with isolated mentions in institutional reports (e.g., ACSS documentation of recognition requests by foreign-trained OTs) rather than systematically collected indicators. No public-domain information is available on attrition in production and influx, and available reports are not disaggregated for OT in general nor OT MH in particular.

Domain: Workforce Quality

Subdomain: OT Workforce with Advanced Education/Certification

Reported figures are dependent on voluntary survey responses and therefore limited in coverage. No national registry exists to record OT educational attainment beyond entry-level or master's degrees, and no systematic data collection occurs for advanced specialization or doctoral qualifications. The number of PhD-trained OTs is small and often confined to academic or research roles, raising ambiguity regarding their availability for practice. Furthermore, data on entry-level requirements are lacking, which could be relevant given international variability in educational standards.

Domain: OT Workforce Distribution by Practice Area and Sector (Nation)

Subdomain: OT Workforce Distribution, by Societal Sector, Total (Nation)

Data availability is limited, with existing figures again based on voluntary survey participation. While ACSS and INE classify OT as a profession, neither provides workforce distribution data for OT in general nor OT in MH specifically. No national official public-domain dataset captures OT practice across government, private, or not-for-profit sectors, despite the recognized importance of third sector employment in Portugal. However, at

international level, WFOT Human Resources Hub reports percentages for Portuguese OTs working on public vs non-public sectors.

Subdomain: OT Workforce Distribution, by Role, Total (Nation)

Information is not publicly available or disaggregated for OT for most indicators. No systematic mechanism exists to capture distribution of roles across practice, academic, or administrative functions, and mixed-role profiles are not accounted for. The only available estimates are derived from survey responses, with the limitations of representativeness noted above.

Subdomain: OT Workforce Distribution, by Practice Area, Total (Nation)

Available data derives from survey-based reports, which depend on voluntary participation and are linked to ACSS registry figures that may not represent the full workforce. There is no centralized data system capable of accurately estimating OT distribution across practice areas, and detailed information is missing for MH roles outside psychiatric facilities, such as in pediatric, geriatric, or community-based settings. Accurate estimation would require access to internal staffing or provider-level data, which are not available in the public domain.

Domain: Geographic Distribution (Mappable)

Subdomain: OT Workforce Supply Distribution (Practising), by Geography

No granular or regional breakdowns of workforce data are available in the public domain. Existing survey-based data lacks sufficient coverage to reliably assess equity of distribution, and the likely uneven spread across urban and rural areas cannot be verified through structured data. No systematic collection mechanisms were identified to generate geographically mappable indicators for OT supply.

Subdomain: OT Workforce Production Distribution, by Geography

Data availability is limited to RAIDES survey outputs, which report information linked to institutional locations but not to student origins or professional practice destinations. Metrics on graduate flows, vacancy fill rates, or longitudinal geographic trends are absent, and no stratified data are reported for OT programs or OT MH specialization programs. Available data are inconsistent in granularity and lack standardized structure for broad comparison.

The framework enabled structured assessment of the OT workforce data system, including the identification of available supply indicators, computation of ratios, and preliminary

mapping of data. The results also revealed persistent data gaps, reliance on self-reported surveys, and the absence of institutionalized registries, which restrict systematic monitoring of OT workforce supply and distribution, particularly in the MH field.

4.3 SWOT Analysis of the Portuguese OT Workforce Data System

This section presents the outcomes of Aim 3, focused on the situational analysis of the Portuguese OT workforce data system. Using the SWOT framework, as outlined in Methods Section 3, this situational assessment analysis identified internal strengths and weaknesses of the data system, as well as external opportunities and threats. The SWOT analysis was informed by both quantitative and qualitative data extracted through the framework checklist, including workforce supply indicators, geographic distribution metrics, and data granularity, with particular attention to OT in general and MH in specific. The purpose of this analysis was to assess the data system's capacity for workforce monitoring, including the feasibility of data integration, longitudinal tracking, and geospatial mapping, as well as identifying areas requiring development or policy attention.

Table 2. SWOT Analysis of the Portuguese OT Workforce Data System

Concept	Points
Strengths **(Internal Advantages)**	– Existence of professional association (APTO) with member registry and periodic national surveys, providing workforce insights on demographics, practice areas, and education (Jesus et al., 2023). – WFOT reporting ensures Portugal is represented in international comparative workforce monitoring, supporting benchmark analysis (*WFOT*, 2021). – Higher education system (RAIDES/DGES) records OT student enrolments, graduates, completions at a national level and institutional-level locations, enabling partial data system and geographic tracking of workforce inflow (*DGEEC*, 2022). – Centralized health data via ACSS allows partial data registration on OT workforce in the public health system (based on licensed/registered OTs data), supporting nationwide population-based denominator calculations for workforce ratios (*ACSS*, n.d.). – Existing survey data (APTO, 2023) includes province/district location of practising OTs, allowing preliminary estimation for regional mapping of workforce distribution. – PORDATA and INE provide reliable longitudinal demographic and population data (inclusive per geographic regions) for workforce ratio calculations and regional analyses (*PORDATA*, n.d.; *Portal do INE*, n.d.).

Weaknesses **(Internal Limitations)**	– Data fragmentation: no national unified OT workforce database; datasets scattered across APTO, ACSS and RAIDES, with no integration or cross-validation (*ACSS*, n.d.; *DGEEC*, 2022; Jesus et al., 2023). – Survey bias and limited representativeness: APTO surveys rely on voluntary participation, introducing potential response bias and limiting accuracy (Jesus et al., 2023). – Inconsistent workforce stock figures across sources (when available): APTO website reports "around" 2,950, WFOT and COTEC 2,880 (*APTO*, n.d.; *COTEC*, n.d.; WFOT, 2024). – Lack of disaggregated, granular or longitudinal public-domain data: critical indicators such as attrition (retirement, migration, career switches), rural–urban distribution, underserved areas and sector-specific employment (e.g., mental health, community-based) are absent. – Irregular data updates between sources and databases limiting timely monitoring. – OT-specific data often merged with other rehabilitation professions in official datasets, reducing profession-level granularity (*ACSS*, n.d.). – No unified geospatial framework integrating workforce, education, and employment data, restricting consistent mapping across multiple indicators.
Opportunities **(External Facilitators)**	– Growing national and EU policy focus on health workforce planning could prioritize investment in OT-specific and OT MH monitoring (OECD, 2016). – Workforce observatories (e.g., WHO NHWA framework) provide strategies for workforce data collection that could be applied to Portugal OT workforce Supply and Distribution Data Systems (*NHWA*, n.d.). – Potential integration of ACSS employment registries, APTO professional registry, and RAIDES education data could create an initial comprehensive, longitudinal workforce information data system for OT and MH OT specific . – EU funding programs (Recovery & Resilience Plan, Horizon Europe) could be leveraged to strengthen OT workforce data infrastructure and enhance spatial mapping, particularly for disaggregated OT and MH specific indicators. – Leveraging international WFOT frameworks and guidelines for workforce monitoring may enhance national comparability and data quality (WFOT, 2024a). – Recent release of WFOT Workforce Hub dashboard with nation level data (WFOT, 2024b). – Development of GIS-based workforce mapping tools could integrate survey, registry, and education data to visualize regional OT workforce supply and gaps.
Threats **(External Barriers)**	– Policy invisibility of OTs: smaller profession size risks low prioritization and overshadowing in national/international workforce planning, limiting political support for dedicated data systems (WFOT, 2024a). – Fragmented governance: multiple institutions own partial datasets (DGES, ACSS, APTO) with no legal mandate for data integration or aggregation. – Risk of underestimation: absence of accurate, disaggregated OT data may obscure shortages or maldistribution, particularly in MH and community-based sectors. – Migration flows: inward/outward OT migration is not systematically monitored, complicating workforce capacity projections (OECD, 2016) – Data protection and legal barriers (GDPR) on national and European levels may restrict data infrastructure and geolocated sharing and integration between professional, education, and health employment registries without explicit agreements (EU, 2016) – Persistent reliance on survey-based estimates creates uncertainty in key workforce indicators (supply, distribution, practice area allocation), affecting strategic planning. – Unavailable/fragmented georeferenced data risks misrepresentation of workforce distribution, particularly in underserved or rural regions. – Absence of longitudinal spatial data limits monitoring of temporal shifts in workforce density and mobility.

SWOT Analysis Synthesis

Strengths

The Portuguese OT workforce data system benefits from multiple complementary sources that provide partial but structured insights into workforce characteristics. The existence of a professional association (APTO) enables periodic surveys capturing demographic, educational, and practice-area data (Jesus et al., 2023). WFOT and COTEC reporting ensures Portugal is included in international comparative monitoring, supporting benchmarking and global situational awareness (*COTEC*, n.d.; WFOT, n.d.). Higher education datasets (RAIDES/DGES) and centralized health registries (ACSS) provide longitudinal enrolment and workforce data, facilitating preliminary population-based ratio calculations (*ACSS*, n.d.; *DGEEC*, 2022). Importantly, province- and district-level survey data enable initial geographic mapping, while national demographic datasets (PORDATA/INE) support standardized regional analyses (*PORDATA*, n.d.; *Portal do INE*, n.d.). These elements constitute internal strengths that provide a foundation for system enhancement and potential integration of workforce data streams.

Weaknesses

Significant limitations remain, reflecting internal fragmentation and gaps in data infrastructure. No unified national public-domain OT workforce database exists; data are dispersed across multiple institutions without integration or cross-validation. Survey-based data are subject to low response rates and potential bias, resulting in limited representativeness. Conflicting workforce stock figures further reduce reliability, while critical indicators such as attrition, migration, rural–urban distribution, sector-specific employment, and MH specialization are either absent or insufficiently granular. Additionally, data updates are irregular, OT-specific information is often aggregated with other rehabilitation professions, and no geospatial framework exists to support integrated, consistent mapping across multiple indicators.

Opportunities

External factors present significant potential for enhancement of the OT workforce data system. National and EU policy initiatives increasingly prioritize health workforce planning, creating avenues for targeted investment in OT and MH-specific monitoring. International workforce observatories and frameworks (e.g., WHO NHWA, WFOT Global Strategy) offer models for data collection and integration (*NHWA*, n.d.; WFOT, 2024a). WFOT Workforce

Hub dashboard, released in May 2025, provides access to some indicators on nation-level data. Though this data is collected from national member organizations, it is a centralized platform that enables visualization and comparison between some indicators (WFOT, 2024b). Linking ACSS employment registries, APTO broader registry, and RAIDES education data could produce a comprehensive, longitudinal system. Further, GIS-based mapping tools and EU funding programs can support spatial visualization of workforce distribution, to adress existing geographic data gaps and enabling policy-relevant workforce planning (C. Costa et al., 2020).

Threats

External barriers limit the ability to develop a robust, integrated workforce data system. OT's smaller professional size in comparison to other professional categories (even in the broader health and rehabilitation sectors) may result in low prioritization in policy agendas, while fragmented governance across ACSS, APTO, and DGES complicates institutional collaboration. Inaccurate or absent disaggregated data risks underestimation of workforce shortages, particularly in MH and community-based settings. Inward/outward migration is not systematically monitored, and data protection regulations (GDPR) restrict geolocated data sharing (EU, 2016). Continued reliance on survey-based estimates raises uncertainty in key indicators, while limited georeferenced and longitudinal data constrains monitoring of temporal and spatial workforce trends.

The SWOT analysis highlights that, although the Portuguese OT workforce data system possesses partial data sources and allows preliminary workforce characterization, its fragmentation, reliance on voluntary reporting, and lack of longitudinal, disaggregated, and georeferenced data constrain systematic monitoring and mapping capabilities. Addressing these gaps for OT and MH OT particularly, as well as for geographic mappable supply distribution, is critical for informed workforce planning and strategic development. The findings underscore the potential value of data integration, GIS-based mapping, and international benchmarking to strengthen national OT workforce data systems.

5 Discussion

The present study was undertaken with the primary purpose of developing a framework-based, situational analysis of the Portuguese OT workforce data system, inclusive of MH indicators, to inform evidence-based improvement recommendations. Specifically, the

study sought to accomplish the following aims: Aim 1) To develop a conceptual framework of OT workforce supply, inclusive of MH indicators and of a checklist for systematic data collection; Aim 2) To apply the developed framework to systematically a) identify public-domain data, data sources, or gaps regarding the OT and MH OT workforce supply in Portugal, and b) collect data on the framework and checklist usage through an initial beta testing process; and Aim 3) To develop a situational analysis of the Portuguese OT workforce data system using a SWOT template, contextualized through a comparison with the United States.

The findings of this study are interpreted through a situational assessment that integrates results from the framework application, SWOT analysis, existing literature, and the US comparison. The pilot application of the framework revealed critical insights into data system gaps, fragmentation, and limitations in the granularity of information, particularly for MH OT, highlighting the potential for future data system improvements that enhance collecting, monitoring, planning, and workforce development initiatives.

This work is novel in providing the first structured workforce data system situational assessment in Portugal, both for OT and specifically for MH OT. It directly responds to the WFOT Workforce Global Strategy, specifically to Aim 1, which emphasizes that "detailed, current and accessible occupational therapy workforce data worldwide is not available at this time" (Jesus, Zweck, et al., 2024; WFOT, 2024a). WFOT also identifies that "Knowing the status of the occupational therapy workforce is required to identify needs and monitor workforce development over time. This knowledge depends on data" and "The systematic collection, integration and reporting of workforce data is necessary for the information to be valid, comparable, useful and utilized for strengthening activities" (WFOT, 2024a). In aligning with this global strategic direction, the present study offers a methodological and analytical contribution that can serve as a foundation for evidence-informed workforce policy and planning, particularly in the context of OT MH supply, mainly in Portugal as pilot tested.

5.1 Conceptual Framework and Checklist

The conceptual framework and associated checklist developed in this study represents a contribution to the OT and MH OT workforce literature, particularly within the Portuguese context. Its novelty lies in the structured approach to systematically map the Portuguese

workforce data system, integrating multiple domains and indicators relevant to OT and MH OT workforce supply, distribution and geographically mappable data. The framework's usefulness relies on identification of existing datasets, data gaps, and potential metrics for future monitoring. Importantly, its design allows for applicability beyond Portugal, providing a replicable and scalable tool that can be adapted to other national contexts, while maintaining alignment with international standards and workforce frameworks such as the NHWA, WFOT Global Strategy, and WHO Guide for Rehabilitation Workforce Evaluation (*NHWA*, n.d.; *WHO*, n.d.; WFOT, 2024a). The quality of the framework is dependent on a comprehensive method to map data, as achieved in this study through the theoretical process described before (i.e., methods sections), which included synthesis of health and rehabilitation workforce existing frameworks, models, guidelines and relevant literature (Jesus et al., 2017b).

The framework checklist application to the Portuguese OT and MH OT workforce data system identified critical gaps, particularly in the availability, granularity and stratification of public-domain data. These gaps underscore both the utility of the framework as a diagnostic tool and the challenges of workforce planning in contexts where systematic, profession-specific data are limited to none.

5.2 Framework Checklist Application to Portugal

Application of the checklist to the Portuguese OT workforce supply and distribution data system revealed substantial fragmentation and limited granularity of OT workforce data, with MH OT effectively absent on national public-domain available data. The principal source of workforce information was the APTO report on the national survey (Jesus et al., 2023). No alternative comprehensive or validated data sources were found for the specific aims and scope of this study.

Several Portuguese public-domain databases provide partial information on healthcare and rehabilitation workforce supply, including PORDATA, ACSS, ERS, and SNS. These databases report stratified data for professions such as physicians, nurses, pharmacists and, in some cases, PTs, but OTs are aggregated into broader categories, such as "diagnostic and therapeutic technicians" (*ACSS,* n.d.; *ERS*, n.d.; *PORDATA*, n.d.; *SNS*, n.d.). Indistinguishable situation is verified when consulting Portuguese census records, both on public-domain available data indicators and on geographical/spatial tools (*Censos2021*,

n.d.; Haakenstad et al., 2022; INE, 2021). More importantly, none of these databases includes a single indicator specifically for OT in MH or even OT in general, and spatial/geographic data is rarely provided (if at all) at a granularity level suitable for mapping:

"SNS Transparência" includes a database of health professionals' workforce with geographic distribution by health services/facilities, such as psychiatric hospital "Magalhães Lemos", where exists MH OT and OT supply. However, data on human resources and workforce is aggregated under "senior technicians," rendering OT in MH workforce distribution unidentifiable (SNS, 2025). Similarly, "Dados.gov" reports numbers of professionals for various occupational categories – including doctors, interns, nurses, pharmacists, operational assistants, IT technicians and diagnostic and therapeutic technicians – but lacks any OT workforce stratified indicator (Administração Pública, 2025). ACSS data includes medical retirement forecasts, yet comparable projections for other health workforce professions such as OT are absent (Administração Pública, 2018). The SNS 2018 report aggregates rehabilitation professionals, including OTs, under "diagnostic and therapeutic technicians," precluding granular workforce analysis (SNS, 2018). The same situation is verified on international data systems, such as Eurostat, which provides data on healthcare workforce for different professions, including regional data for PTs, but no public-domain stratified data for OTs or MH OTs is available (Eurostat, 2023).

From education sector, DGEEC reports allow calculation of master's-level graduates by institution and specialization, per year, providing partial insights into the influx of OTs specialized in mental health, though graduate-level qualification alone is sufficient for practice in Portugal (DGEEC, n.d.).

The APTO (2023) national survey, while providing partial workforce distribution estimates, carries the risk of unrepresentative sampling due to volunteer bias, limiting the validity and reliability of workforce estimates and reflecting broader limitations from the Portuguese data system for OT, particularly in MH. An ACSS report from 2018 points five foreign OTs requested recognition of qualifications to work in Portugal (*ACSS*, n.d.), but no subsequent data can be found.

Back in 2015, the National Inventory of Health Professionals managed by ACSS was established by law (Law No. 104/2015). Intended to be a "tool for planning the needs of healthcare professionals in the public, private, and social sectors, as well as for coordinating

human resources policies", after 10 years this database is yet to be available and could potentially present stratified data for OT and OT in MH, enabling comprehensive workforce planning and eventually geographical mapping analysis. No scheduled date for the launch of the platform is accessible on ACSS platform (ACSS, 2015; Diário da República, 2015).

Apart from databases and reports, the only national public-domain data to be found available was a dissertation from an OT graduate (2002) surveying 89 of 169 OTs in the National Health Service, which corroborates current findings of very limited, scattered, survey-dependent workforce data (Nobre, 2002).

Internationally, the "The COTEC Summary of the Occupational Therapy Profession" offers limited quantitative information on the OT workforce, such as total numbers, ratios per 10,000 inhabitants, student enrollment, and private-sector engagement. Most questions are answered dichotomously and lack the necessary granularity for workforce data systems monitoring and planning. COTEC annual report serves as a strategic resource for European OT workforce policy but remains insufficient for detailed national analysis (*COTEC*, n.d.). OECD database system has indicators on: personal care workers, dentists, midwives, nurses, pharmacists, physicians and PTs. No data on OT was found (OECD, 2024). WHO Global Health Workforce statistics database has health workforce comprehensive data on medical doctors, nursing and midwifery personnel, dentistry, pharmaceutical, environmental and occupational health and hygiene personnel, medical and pathology laboratory personnel, PT personnel, traditional and complementary medicine personnel, community health workers and even PT technicians and assistants, but there is no single indicator, stratified data or granular-level data for OT or MH OT with available data (WHO, 2023b). Although Global Health Observatory (GHO, 2018), presents the only indicator related to OT MH and OT in general (i.e., "Mental Health Workers" as "Occupational therapists in mental health sector (per 100,000)"), there is not enough data collected to enable visualization or presentation of data outputs on the specified indicator (GHO, n.d.).

The same happens with NHWA Data Portal, which has stratified data per professional area, but no indicators on OT or MH OT (WHO, 2025). Identical situation is verified on WHO Global Expenditure Database (The World Bank, 2025).

European Health Data Space (EHDS) project (released in 2025) aims to become the first common EU data space dedicated to health, for the use and exchange of electronic health

data across the EU, but no public-domain data on OT or MH OT is available or reported so far (European Commission, 2012)

WFOT biennially collects data on OT workforce from its member organizations (if available) (WFOT, 2024a) and the most comprehensive and stratified resource available is the WFOT Human Resources project 2024 (WFOT, 2024b) a new interactive platform that enables data visualization, filtering by region (i.e., country-level), and export results. This WFOT dashboard presents data collected by the WFOT on the global OT workforce (i.e., information on practicing OTs, education programs, regulatory requirements, and services provided across different countries) (WFOT, 2024b). Nevertheless, data presented relies on responses that were received from WFOT Member Organizations or WFOT Delegates (WFOT, 2024b). Plus, only cross-sectional data is presented (i.e., dashboard has data for 2024, collected in 2023 and presented in May 2025).

5.3 SWOT Analysis

The situational assessment of the Portuguese OT workforce data system via SWOT analysis revealed various critical points. Regarding strengths, the APTO survey provided survey answers data on workplace location, enabling aggregation for larger regions, demonstrating that even limited granular data can inform regional workforce analysis. Weaknesses included the absence of stratified and granular OT workforce data across public databases, reflecting a common issue in global OT workforce studies: data scattered across registration/licensure bodies, immigration agencies, census organizations, and sector-specific databases, often aggregated with other professions, impeding accurate workforce assessment (Boniol et al., 2022; Jesus, Mani, Bhattacharjya, et al., 2023; Jesus, Mani, Ledgerd, et al., 2022; WFOT, 2024a)

Opportunities identified include alignment with international initiatives, such as WHO NWHA and WFOT which provides cross-national framework for data collection and OT global benchmarking, alongside the WHO Guide for Rehabilitation Workforce Evaluation as a tool for detailed cross-professional workforce assessment (Jesus, Mani, Bhattacharjya, et al., 2023; *NHWA*, n.d.; WFOT, 2024a). WFOT Human Resources project 2024 dashboard data estimates that MH is the sector with the highest vacancy rates for OTs worldwide, meaning that there are opportunities to reinforce OT MH supply and distribution.

Furthermore, MH and dementia are reported to be the two primary areas of practice for OTs facing supply shortages in Portugal (WFOT, 2024b).

Databases from educational systems such as "Infocursos" and DGEEC further allow estimation of OT graduate influx (*DGEEC*, 2022).

The SWOT findings indicate that while Portugal currently lacks integrated and granular workforce data, existing structures could build the foundation for a systematic, internationally comparable OT workforce information system.

5.4 Country Context and Workforce Data Systems: Comparison between Portugal and the United States

When contextualizing the situational analysis of the OT workforce data system, it is essential to first consider the broader demographic, economic, and health-financing contexts in which the profession is embedded. Portugal and the United States (USA) are both high-income countries, yet they differ substantially in scale, population structure and health system financing models (Supplementary Material 7). Portugal has a population of approximately 10.5 million people, contrasted with the USA's 340 million, and its territorial extension is markedly smaller (91,606 km² compared to 9,147,420 km²). Population distribution also diverges, as 32% of Portugal's inhabitants reside in rural areas compared with only 16% in the USA, a factor with direct implications for health workforce distribution, service access, and urban–rural disparities (Hayes et al., 2023).

Economic indicators further highlight these differences. While both countries are classified as high-income by World Bank, Portugal's gross domestic product (GDP) per capita at purchasing power parity is US$ 50,617, significantly below the USA's US$ 85,810. Similarly, gross national income per capita in Portugal (US$ 26,620) is less than one-third of that in the USA (US$ 83,660). These disparities extend into health expenditure patterns: per capita health spending is US$ 2,744 in Portugal compared to US$ 12,434 in the USA, reflecting a markedly different capacity to finance health services. Government health spending also differs, with domestic general government health expenditure comprising 15% in Portugal versus 25% in the USA. Collectively, these structural contrasts shape the opportunities and constraints for health data systems, infrastructure and OT workforce development within each national context.

These structural contrasts provide an important backdrop for understanding the ways in which workforce monitoring systems have evolved in Portugal and the USA, and how they align with international benchmarks for health workforce data collection and governance. In both countries, the burden of chronic disease, MH conditions, and ageing-related disorders requires careful workforce planning. However, the gaps in Portuguese data collection forecast viable estimations or projections regarding supply and demand for OTs, especially working in MH – a domain where population needs and services demand are rising in line with higher prevalence of MH-related disorders and psychiatric conditions (Liu et al., 2025).

The USA has a comparatively long tradition of systematic workforce monitoring across health professions, supported by robust national databases, professional associations, and inter-agency collaborations. OT workforce data in the USA are captured through several public-domain sources, including the Bureau of Labor Statistics (*Bureau of Labor Statistics*, 2025), the Health Resources and Services Administration (*HRSA,* n.d.), and the American Occupational Therapy Association (*AOTA*, 2023). In the same way, databases, dashboards and stratified data for OT and MH OT is available on Census Bureau Data and other sources dedicated to data collection, monitoring and mapping (*Bureau of Health Workforce*, 2024; *Data USA*, 2025; *United States Cencus Bureau*, 2020; *United States Department of Labor*, 2023). All these data sources provide regular, standardized, and nationally representative information on OT workforce size, geographic distribution, demographics, and employment settings. Importantly, these datasets often include MH practice settings (e.g., hospitals, community-based programs, school systems, and behavioral health services), which allow for a granular understanding of how OTs contribute to MH service delivery and how supply and distribution match population needs (Supplementary Material 8). Such systematic collection facilitates longitudinal monitoring, supports policy planning, and ensures that OT is integrated into broader health workforce strategies. Furthermore, USA also relies on OTs assistants, whose data numbers can be accessed through WFOT Human Resources project 2024 (WFOT, 2024b). Also, plasticity in health workforce is documented, as a degree of compensatory supply exists among, for example, PTs and OTs. In the USA, there are less per-capita PTs than in Portugal, but nearly twice the number of OTs (Jesus et al., 2016b, 2017b) .If there is no reliable and stratified data, accounting for all supply variations might not be possible.

Not only in the USA, but in the Americas, it is possible to access public-domain reliable data: WHO PAHO Data Portal (WHO, n.d.) is a health rehabilitation workforce dashboard with visual data that displays both overall and profession-specific workforce density, along with the ratio of rehabilitation personnel to the population requiring rehabilitation across countries. It presents public "data on rehabilitation personnel of six of the core rehabilitation professions", including OTs detailed per country (Supplementary Material 9).

For instance, the Canadian Institute for Health Information (CIHI) published (2013) an OT manual database, which serves as a comprehensive technical guide for submitting data to an OT database, one of 27 health databases managed by CIHI. This enhances standardized data collection, supply-based data on OTs in Canada to support health human resources planning. The resource includes comparative data on the demographic, geographic, education, and employment information of OTs (CIHI, n.d.).

In addition, there is already research on Australia focused on spatial justice and how OTs must address the intersection of needs, demands and supply indicators with geographic and spatial analysis to seek occupational justice and equitable service delivery (Hayes et al., 2023, 2025).

By contrast, Portugal lacks a centralized or comprehensive system dedicated to OT workforce monitoring, in stratified for MH. As identified in this study, public-domain data is scarce, fragmented, and often embedded within broader professional or health system categories, which makes it difficult to derive a complete picture of the OT workforce, particularly for OTs in MH. Available data is not granular nor stratified and more often scattered across institutions and not systematically integrated. This absence particularly affects OTs working in MH area, where the profession has potential to meet population needs , for example, in community-based psychiatric rehabilitation, dementia care, and recovery-oriented practice. The inability to accurately quantify current and future MH OT workforce supply and distribution characteristics hinders workforce equitable distribution and planning to face demand pressure, at a time when MH needs are rising (Liu et al., 2025).

When considered through the lens of international frameworks such as the WHO's NHWA and the WFOT's Global Workforce Strategy, the USA aligns closer with recommended practices, particularly in terms of data systems availability, consistency, and utilization for planning (*NHWA*, n.d.; WFOT, 2024a). Portugal, meanwhile, reflects the challenges of many small-to-medium high-income countries where workforce data infrastructures remain

underdeveloped, despite growing demands for evidence-based HSR and systems planning (Barr et al., 2019). The lack of dedicated data on OT and data absence in MH OT supply exemplifies this gap, leaving researchers, policymakers and stakeholders without the information needed to design targeted strategies for one of the most pressing areas of public health. This situational gap underscores the originality and necessity of the framework and SWOT analysis developed in this study, as it not only maps the current limitations but also proposes pathways for strengthening OT workforce monitoring in Portugal.

5.5 Implications

The findings of this project have several implications for OT and MH OT workforce monitoring, planning, and policy development in Portugal and beyond. Central to these implications is the principle that if it is not measured, it cannot be improved ("If you cannot measure it, you cannot improve it", William Thomson Klevin). The absence of systematic, granular, and stratified data on Portuguese OT, and particularly on OT in MH, as well as spatial data on urban vs rural or underserved areas makes it difficult to estimate supply, anticipate future needs, or design evidence-based interventions for equitable access to health services and resources. In practice, this means that the OT workforce, particularly in MH, is not only underrepresented but also under-recognized in health planning processes. The first step toward meaningful change is therefore the establishment of robust mechanisms for measurement and data collection.

The gaps identified in this study, ranging from limited information on OT workforce supply and distribution to the total absence of MH specific indicators becomes especially critical when linked to Portugal's demographic profile. The country faces an ageing population alongside rising rates of chronic conditions and MH needs (Jesus et al., 2025b). Without the ability to monitor the size, distribution, and characteristics of the OT workforce, stakeholders such as researchers and policymakers cannot adequately respond to these pressures. The lack of visibility of OT in MH is particularly concerning, as it prevents the profession from being positioned as part of the solution to growing service demands.

While this dissertation focused on supply and distribution-side data, the potential of services utilization-data as a proxy for supply must also be highlighted (e.g. minutes of utilization can be transformed into estimates of working hours, which in turn can be

converted into the number of professionals required to meet population needs and demand). This method illustrates how utilization and supply are interconnected and how innovative methodologies can help fill data gaps when direct workforce measures are unavailable.

At the level of practice and service delivery, better monitoring translates directly into better planning. A systematic and reliable workforce data system allows for alignment of OT resources with population needs, service distribution, and access, particularly in rural or underserved areas. Without this information, there is little basis for ensuring equitable distribution of human resources for health, such as OTs and OTs working in the MH field, across regions and geographic units. This work therefore contributes directly to the objectives of the WFOT Global Strategy for the OT Workforce, especially Aim 1, which emphasizes the need for reliable workforce data as a foundation for strengthen and sustainable development of the profession worldwide (WFOT, 2024a).

The issue of rurality further illustrates the complexity of workforce data needs, geographic mapping and data systems. Even when public-domain data is available, it often lacks sufficient precision to capture geographic variations (e.g., within rural and underserved areas). Current approaches frequently reduce rurality to a dichotomous measure (i.e. rural vs. urban), which oversimplifies the reality of diverse rural contexts (Hayes et al., 2025). Rurality is multi-layered and requires more nuanced classification systems to inform planning (i.e.: What is rurality? What metrics are used to determine it?). For international comparability, a standardized approach is necessary. One such system is the Nomenclature of Territorial Units for Statistics (NUTS), developed by Eurostat (*Eurostat*, 2023). NUTS offers a hierarchical classification of regions designed to harmonize statistical data collection across European countries. Its adoption for OT and MH OT workforce data would enhance comparability, facilitate nationwide and cross-national studies, and provide a sound basis for evidence-informed policy development.

Data precision and granularity are also critical for advancing geospatial approaches to workforce monitoring. Compared with the USA, where data systems allow for granular analysis, Portugal lacks both the volume and depth of data necessary for accurate georeferencing. Granular data is not only more adaptable to transformation and computation but also enables integration with Geographic Information Systems (GIS). Georeferencing (i.e. the process of aligning spatial data with real-world coordinates) relies

on sufficiently detailed datasets to generate accurate maps and analyses (Kirby et al., 2017). For workforce planning, this means that data quality directly determines the ability to identify patterns, forecast needs, and strategically allocate resources.

Equally important is the recognition that workforce data does not need to rely on a single indicator. Effective monitoring can be achieved with composite measures, using both numerators and denominators. However, such calculations require the systematic availability of data, which is currently absent in Portugal (e.g., for OT and OT in MH) . Minimum requirements for workforce monitoring, as set out in the WHO's NHWA (Haakenstad et al., 2022), should therefore be adopted as a benchmark for Portugal's system development. This would not only improve national planning but also align the country with international standards for data comparability.

The issue of data quality cannot be overlooked. Current reliance on self-reported volunteer survey data raises concerns about representativeness and introduces risks of bias that undermine the reliability of findings. Without independent, systematic, and validated data collection processes, the precision needed to inform policy, research, and planning remains out of reach.

Ultimately, the lack of robust and accessible Portuguese OT and MH OT workforce data has concrete consequences. If the supply of OTs (particularly in MH) is unknown, then there is no basis for ensuring that human resources are equitably distributed according to population needs, demand, and access. This issue is not confined to rural and underserved areas but extends to major metropolitan areas as well, where even higher service availability might not compensate for the absence of targeted workforce planning. The implications of this dissertation are therefore clear: without reliable and granular data, the capacity of Portugal to respond to demographic and health system pressures is fundamentally constrained, and the potential of OT to contribute to population health and well-being, particularly in MH, will remain underrealized.

5.6 Limitations

Notwithstanding the limitations, this project provides novel insights on the status of OT workforce data system in Portugal, the development of a conceptual framework for data collection, and the situational analysis conducted through a SWOT approach. Nonetheless,

several constraints must be acknowledged in order to contextualize the findings and guide future research:

First, although the conceptual framework was developed based on a structured and comprehensive literature review, it does not reflect a systematic or scoping review and must not be interpreted as such.

Second, exclusion of non-English/Portuguese data sources may not reflect information if only available in other languages.

Third, the study was conducted without participatory framework development process. Ideally, the creation of the conceptual framework and the accompanying checklist for data collection would have been strengthened through the input of an international advisory board that could have brought together expertise on workforce data systems, OT, OT in MH across multiple contexts and Portugal's system. This would increase the validity, comprehensiveness, and applicability of the tools developed.

Fourth, the refinement of the SWOT analysis would benefit as well from international advisory board expertise consultation for refinement and improvement recommendations.

Third, the research did not involve direct consultation with key informants during the data collection and analysis stages. Engagement with stakeholders (i.e. particularly those with expertise in Portuguese health data systems, OT workforce, and MH services data) would have enriched the process by offering grounded perspectives on data availability, accuracy, and comprehensiveness, as well as qualitative input on the framework checklist application. Their involvement could have served as a mechanism for validation, ensuring that data sources were fully captured and appropriately interpreted.

Fifth, at the methodological level, the reliance on public-domain available data sources meant that informal or unpublished data—potentially held by institutions, associations, or services—were not accessible for triangulation.

Finally, the scope of the study was deliberately bounded by its focus on supply-side data, which necessarily excluded important dimensions such as workforce demand, utilization, or productivity. While these were beyond the scope of the current research, their omission underscores the need for integrated approaches that combine multiple workforce dimensions for a more comprehensive picture of OT workforce data systems capacity.

These limitations should not be seen solely as constraints but also as opportunities for systems strengthening. The absence of participatory processes and key informant validation points toward clear pathways for future work.

5.7 Future Directions

Building on the findings and limitations of this study, several important future directions can be identified for the development of OT workforce data systems, with particular attention to Portugal and MH contexts. Implementing the conceptual framework and checklist here developed and piloted for data collection systems, could provide a uniform starting point for monitoring and analyzing OT workforce data. If workforce data is not measured, it cannot be changed; therefore, systematic monitoring is a necessary first step for informed action.

A clear priority is the establishment of a unified, integrated OT workforce information system, which consolidates workforce data across institutional stakeholders (e.g., including APTO, ACSS, SNS, GDEEC, DGS) in Portugal. This would allow for greater transparency, comparability, and integration across datasets, creating an evidence base that is both reliable and accessible. At the same time, supply and distribution equity strategies demand the adoption of GIS-enabled workforce mapping. Geographic Information Systems (GIS) provide a unique lens for monitoring inequities in OT workforce, with particular relevance for MH OTs working in underserved and rural regions.

MH specific workforce data emerges as another priority. As this study shows, OTs in MH remain underrepresented and often poorly tracked within national data systems. Strengthening mechanisms for systematic collection, integration, and comparison of disaggregated data on this workforce subgroup is essential for advancing human resources planning (WFOT, 2024a). Without robust, MH-specific data, policies risk overlooking the distinctive role of OTs in MH intervention, in a Portuguese context where population needs and demand for MH services are on the rise.

These findings also highlight implications for both policy and workforce planning. Portugal's current fragmented data system environment underscores the need for policies that align with international workforce strategies, particularly those of WFOT (WFOT, 2024a). By pilot assessing a conceptual framework and checklist application, this dissertation represents an initial step toward operationalizing this global vision. Future directions should involve embedding this framework into national workforce information systems,

developing national dashboards for data visualization, and ensuring that robust and granular data can feed into public-domain repositories for use by stakeholders (i.e., policymakers, researchers, practitioners, community advocates).

Several methodological pathways can guide future research. Iterative testing and validation of the framework should adopt participatory methods. Future work must include an international advisory board composed of experts in OT, specifically for MH, workforce data systems and policy, with clear criteria for roles, timing, and frequency of engagement. Parallel to this, local key informants should be consulted to assess the comprehensiveness and quality of national data collection processes. Their input would help identify additional public-domain datasets that could be incorporated and ensure that the data system reflects national realities. The next step is to evolve this pilot framework into a full model that accounts for the broader determinants of workforce dynamics (i.e., including variables for supply, population needs, utilization, demand and access). Integrating these domains into a full model framework will allow comprehensive understanding of the OT workforce in Portugal and beyond.

International comparison also represents an important direction for advancing the field. Portugal can serve as a pilot case, but the framework must be assessed across diverse contexts to assess transferability. Lessons from the United States (i.e., where workforce data systems are comparatively more developed) demonstrate the value of centralized and longitudinal data infrastructures for guiding policy and practice. Comparative analysis will also help refine the framework to accommodate diverse sociodemographic, geographic, and healthcare system realities, as emphasized by similar workforce modeling initiatives in other health professions (Jesus et al., 2016b).

In parallel, future research should capitalize on technological innovations, particularly GIS and longitudinal workforce mapping (Leitch & Wei, 2024; Osheyor Gidiagba et al., 2024). These methods are emerging frontiers for identifying inequities in workforce distribution, monitoring workforce trends over time, and linking workforce supply with population health outcomes. As geospatial approaches become increasingly embedded in HSR, they can offer actionable insights for workforce planning and equity monitoring, particularly in MH OT (Passalent et al., 2013).

Finally, the broader goal must be to contribute to the development of an OT HRHIS capacity in Portugal. These systems track health professionals from training through their careers, supporting effective health systems planning and management.

This study provides a comprehensive pilot test for the Portuguese OT workforce supply and distribution. The potential transferability of this conceptual framework and application checklist positions it as a contribution to the global movement for strengthening OT workforce systems. By linking robust data with geospatial analysis, policy action, and international collaboration, OTs and MH OTs will be better equipped to address inequities, advocate effectively, and strengthen their role within evolving health systems.

6 Conclusion

This work represents the first structured attempt to map and critically assess the Portuguese OT workforce data system, with a specific lens on MH. By developing and piloting a conceptual framework and data collection checklist, this work presents a novel tool for identifying workforce data system gaps, comparing system capacities, and setting the foundations for more systematic, evidence-based workforce monitoring. The results highlight significant limitations in Portugal's data systems, data availability and integration, particularly for MH OTs, but also demonstrate the feasibility of developing strategies to stregnthen national workforce data systems.

In doing so, this study alingns with the WFOT Global Strategy for the OT Workforce. The framework piloted here not only offers practical insights on MH and OT workforce data system in Portugal but also provides an internationally transferable model aligned with WFOT's global workforce hub initiatives. Its implications extend to national policy, through the potential development of strenghtening activities for national OT workforce. The work further establishes future directions for research and practice. At the national level, it calls for the development of a spatial (i.e., geo-located) workforce database to enhance mapping of OT workforce, linked to indicators of supply, needs, demand, and utilization. At the international level, it underscores the value of comparative assessments, particularly with the United States, to refine metrics, test granularity, and strengthen transferability. Methodologically, future iterations will require the involvement of international advisory board members and local key informants to refine framework elements, validate data comprehensiveness, and enrich SWOT analyses.

Finally, this work provides a step toward strengthening workforce data systems in Portugal and beyond, for OT and OTs in the MH field, to inform policy, planning, and future research.

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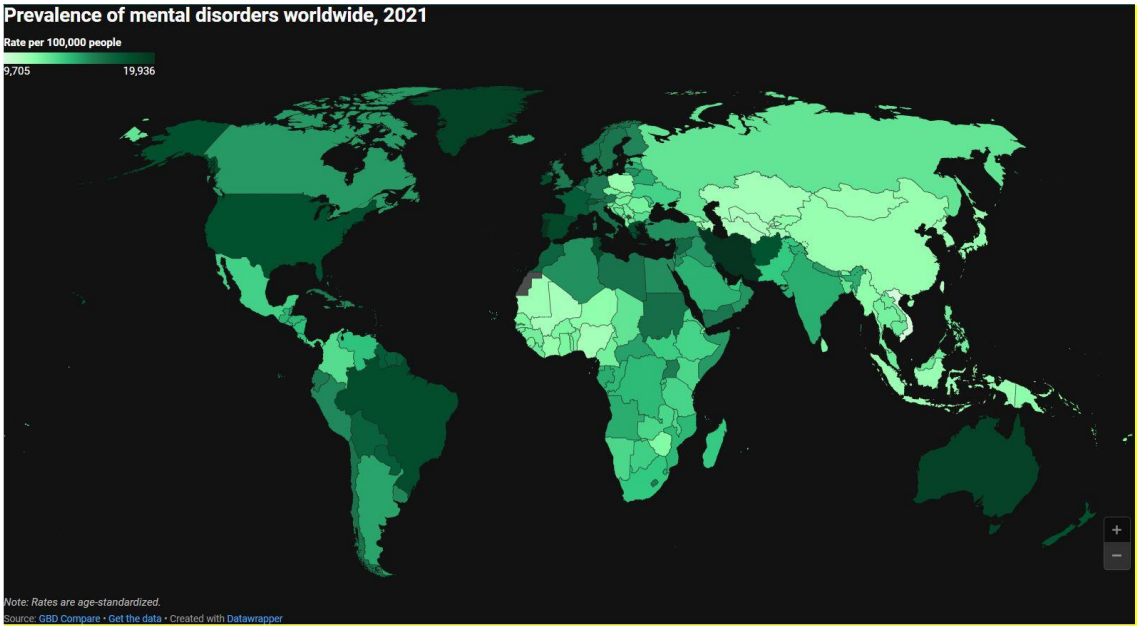
Supplementary Materials

Supplementary Material 1: WFOT Global Strategy seven-step Strategic Directions

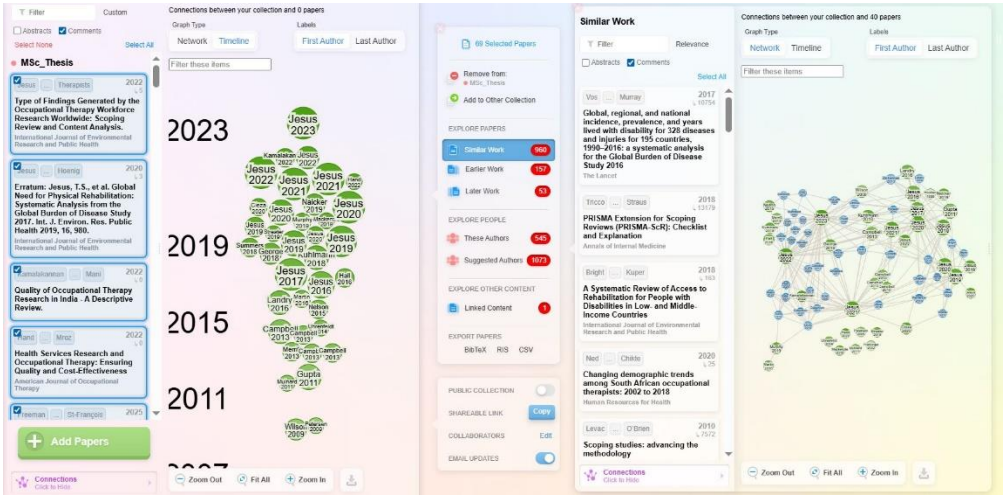
Retrieved from Jesus et al., 2024

Supplementary Material 2: GBD age-standardized prevalence of mental disorders per 100,000 people in the world: Portugal has the highest value



Retrieved from GBD (*Mental health*, n.d.)

Supplementary Material 3: ResearchRabbit, AI tool for literature review and data visualization.



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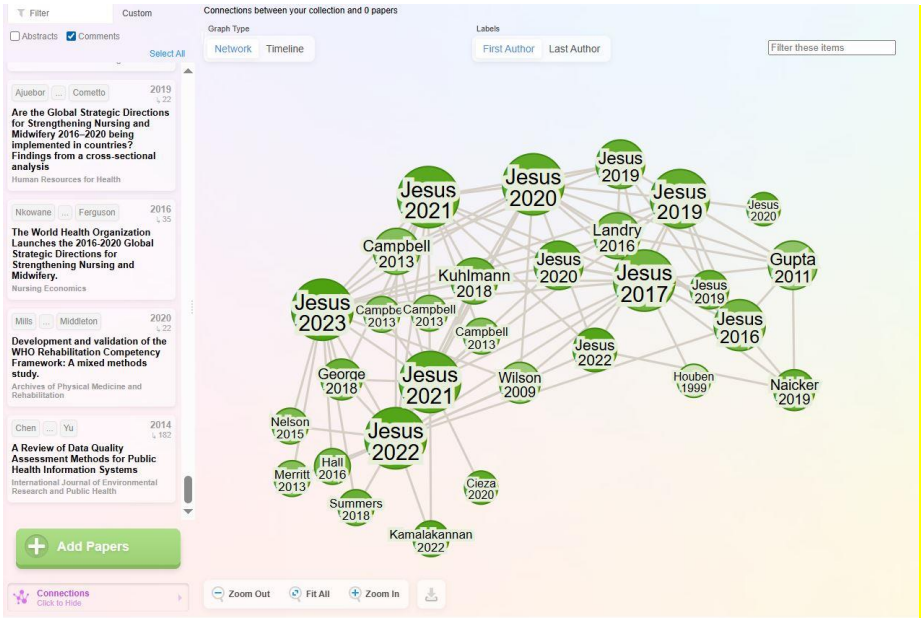

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Supplementary Material 4: Conceptual Framework Checklist Developed for Data Identification and Collection

Data Item				Country									
						Data Source (if applicable)						Limitations	
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
OT Supply	OT Workforce Supply, Total (Nation)	Total Stock (available for practice)	OTs registered/ licensed/ legally available for practice (total), per 10,000 heads of population										
		Total practising / (Self-) Employed OT (count)	practising OTs (count), per 10,000 heads of population										
		Total practising / (Self-) Employed OT (full-time equivalents)	practising OTs (in full-time equivalents), per 10,000 head of population										
	OT Workforce Attrition in the Supply,	Unemployment Rate	OT unemployment rate (% of total OT workforce available)										
		Career switches	OTs that changed careers / do not practice by option (% of the total OT workforce available)										

	Total (Nation)	No full-time practice	OTs that practice part-time (% of total OT workforce available)											
		External Migration – yearly (historical average)	# of OTs that migrate externally (i.e., to another country) to/and register for practice – yearly average of the last decade											
		Retirement rates (historical average)	OTs that have retired per year in the last decade (e.g., yearly average)											
		Retirement rates (planned)	OTs that will attain retirement per year in the upcoming decade (e.g., yearly average)											
Workforce Production	OT Workforce Production and Influx, Total (Nation)	Graduates – yearly, total	total # of nationally trained OT graduates in the last decade (e.g., yearly average)											
		Graduates – yearly, public school	# of nationally trained OT graduates, public schools, in the last decade (e.g., yearly average)											
		Graduates – yearly, private school	# of nationally trained OT graduates, private schools (including not for profit), in the last decade (e.g., yearly average)											
		Graduates – yearly, WFOT-approved program	% of nationally trained OT graduates from WFOT-approved programs (vs total OT graduates, WFOT-approved or not) in the last decade (e.g., yearly average)											
		Immigration – yearly, total	# of OTs that migrate internally (i.e., from another country) to/and register for practice – yearly average of the last decade											

	Attrition in the OT Workforce Production & Influx, Total (Nation)	Graduation attrition	% of students that initiate but do not complete an OT program – yearly average of the last decade											
		Unfilled training spots (public)	% of entry-level OT training vacancies (public schools) that remain vacant / were not filled – yearly average of the last decade											
		Immigration attrition	% of internationally trained OTs that apply for registering/licensing for practice yet failed to complete the process – yearly average of the last decade											
Workforce Quality	OT workforce with advanced education/ certification	Master-level (above entry-level)	% of OTs available for practice that have a master-level (above entry-level) education											
		Professional Doctorate (above entry level)	% of OTs available for practice that have an occupational-therapy doctorate level – not meaning PhD (above entry-level) education											
		Master as entry level	% of OTs available for practice that have a master-level as entry-level education											
		Professional Doctorate as entry level	% of OTs available for practice that have an occupational-therapy doctorate level – as entry-level education											
		PhD level	% of OTs available for practice that have a PhD-level education											
		Formal advanced specialization/credential/certification	% of OTs available for practice that have a formally recognized, advanced specialization/certification/fellows											

			hip/credential (above entry-level) for OT practice											
OT Workforce Distribution, by Practice area and sector (Nation)	OT Workforce Distribution, by Societal Sector, Total (Nation)	Public Sector (Government-based)	% of OTs practising in the government-based or publically-administered settings											
		Public Sector (Local or municipality)	% of OTs practising in the local public sector											
		Private Sector (for profit)	% of OTs practising in the for-profit private sector											
		Industry	% of OTs practising in the Industry sector (products)											
		NGOs, social/not-for-profit, civil society	% of OTs practising in the NGOs, social/not-for-profit, and civil society sector											
	OT Workforce Distribution, by Role, Total (Nation)	Practitioner (clinician, school-based OT), excluding self-employed	% of OTs practising that have employed or service-based practitioner roles, excluding self-employed (own companies)											
		Self-employed/entrepeneur	% of OTs practising that have employed/entrepreneurial (operate own companies) roles, excluding regular clinical OT service to other companies											
		Scholar/academia (researcher, educator)	% of OTs available for practice that have academic roles											

		Managerial/Administrative	% of OTs available for practice that have employed managerial/Administrative roles											
	OT Workforce Distribution, by practice area, Total (Nation)	Mental Health	% of OTs in clinical practice that work in mental health settings including pediatric and geriatric											
		Physical Rehabilitation, post-acute or long-term	% of OTs in clinical practice that work in physical rehabilitation settings, post-acute or long-term, inpatient, outpatient, and home-based											
		Geriatric, not health system	% of OTs in clinical practice that work in non-health system geriatric settings (e.g., nursing home, senior center, assisted living, Alzheimer's' programs)											
		Pediatric-healthcare (not school based, not social/educational)	% of OTs in clinical practice that work in pediatric/development settings (healthcare)											
		School-based or learning disabilities	% of OTs in clinical practice that work in pediatric settings (school-based, learning disabilities / development clinics)											
		Acute care	% of OTs in clinical practice that work in acute-care settings or units											
		Adult Intellectual/Development Desabilites	% of OTs in clinical practice that work in Adult Intellectual/Development Disability contexts											

		Assistive tecnhology	% of OTs in clinical practice that work in assistive technology contexts, including industry											
		Comnunity-based	% of OTs in clinical practice that work in community services (social care, municipalities, civic centers)											
		Other or Emergent areas	% of OTs in clinical practice that work in emergent practice areas (e.g. primary care, prisons, disability advocacy, occupational health etc.), stratify as available											
Geographic Distribution, Mappable	OT Workforce Supply Distribution (practising), by geography	Large Region, State, or Regional Aggregation of States	# of practising OTs in each region, per 10,000 head of population of each region								Mappable			
		Province/District	# of practising OTs in each province/district, per 10,000 head of population of each province/district											
		County Level	# of practising OTs in each county, per 10,000 head of population of each county											
		Rural areas, all combined	# of practising OTs in all rural areas, per 10,000 head of population of all rural areas											
		Rural areas, each	# of practising OTs in each rural area, per 10,000 head of population of each rural area											
		Underserved (Formal designation), all combined	# of practising OTs in all underserved areas (health workforce-shortage Area, medically underserved or											

			equivalent), per 10,000 head of population of all underserved areas										
		Underserved (Formal designation), each	# of practising OTs in each underserved area (health workforce–shortage Area, medically underserved or equivalent), per 10,000 head of population of each underserved area										
	Optional: Geographic stratification of the OT workforce supply, quality and distribution data by each construct and item above												
	OT Workforce Production Distribution, by geography	Graduation, by large region, state of aggregation of states	# of nationally trained OT graduates in the last decade (e.g., yearly average) in each region, per 10,000 head of population of each region										
		Graduation, Province/District	# of nationally trained OT graduates in the last decade (e.g., yearly average) in each province/district, per 10,000 head of population of each province/district										
		Graduation attrition, by large region, state of aggregation of states	% of students that initiate but not complete an OT program by region – yearly average of the last decade, per 10,000 head of population of each region										
		Graduation attrition, by Province/District	% of students that initiate but not complete an OT program by province/district – yearly average of the last decade, per 10,000 head of population of each province/district										

		Unfilled training spots (public), by large region, state of aggregation of states	% of entry-level OT training vacancies (public schools) that remain vacant / were not filled – yearly average of the last decade, per 10,000 head of population of each region											
		Unfillled training spots (public), by Province/Distrcit	% of entry-level OT training vacancies (public schools) that remain vacant / were not filled – yearly average of the last decade, per 10,000 head of population of each province/district											

Supplementary Material 5: Framework Checklist Application to the Portuguese OT and MH OT workforce Data System

Portugal													
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
OT Supply	OT Workforce Supply, Total (Nation)	Total Stock (available for practice)	OTs registered/ licensed/ legally available for practice (total), per 10,000 heads of population	Y	Measured and reported by national association and international federation	Y	Population total (1) WFOT Data (2)	OTs per 10,000 inhabi –tants (OT stock/Total Populationl)×10,000 = (2,880/10,749,635) × 10,000 = 2.68 OTs/10,000 inhabitants	Every 2–3 years	2025	2.68	Irregular data update on sources (e.g. APTO) WFOT data dependent on member association submissions (which may lag behind reality) APTO Reported data dependent on National Survey volunteer answers (n) for OT workforce supply sample APTO Report based on known ACSS number of registered/licensed OTs (which is not the total raw number of Portuguese OTs)	No public–domain institution al–managed registry found on OT data in general, and in MH in particular

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
		Total practising / (Self-) Employed OT (count)	practising OTs (count), per 10,000 heads of population	Y	Collected through survey and reported by national association	Y	Population total (1) APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these, 94.6% referred to be practising in Portugal (aprox. n=914): 914/10,749,635x10,000	Irregularly	2023	0.85		
		Total practising / (Self-) Employed OT (full-time equivalents)	practising OTs (in full-time equivalents), per 10,000 head of population	Y									

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
	OT Workforce Attrition in the Supply, Total (Nation)	Unemploy -ment Rate	OT unemploy- ment rate (% of total OT workforce available)	Y	Collected through survey and reported by national association	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these, 2.1% referred to be unemployed (aprox. n=20); InfoCursos (Portuguese Higher Education Data and Statistics, from General Office for Education and Science Statistics) - presents percentage of recent graduates from OT courses who are registered with the IEFP as unemployed - 2.3% (2025, https://infocursos.medu.pt/)	Irregularly	2023	2.10%	APTO Reported data dependent on National Survey volunteer answers (n) for OT workforce supply sample Lack of updated/available data on items/indicators does not allow combined computation of those indicators for other items/indicators (e.g. updated total stock and total practising could be used to estimate % of total OT workforce registered but not practising) Lack of quantitative and structured data collection and report (e.g. APTO National	Lack of disaggreg ated data for OT in particular No quantitati ve reliable and available data on some items/indi cators (e.g. OT external migration or retirement rates)

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
												Survey (2023) reports that "0.7% of participants answered to be retired". The report details that "3 OTs retired less than a year" from then, "2 retired between 1 and 10 years", "others" between "11 and 15 years" and 6 answered "to be working/worked", though being already retired)	
		Career switches	OTs that changed careers/do	Y	Collected through survey and	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020	Irregularly	2023	1.20%		

				Portugal										
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
			not practice by option (% of the total OT workforce available)		reported by national association			registered Ots data (n=1836); from these, 966 answered the National Survey; from these, 1.2% referred to practice on another field (aprox. n=12);					
		No full-time practice	OTs that practice part-time (% of total OT workforce available)	Y									

Portugal														
Data Item						Data Source (if applicable)						Limitations		
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
		External Migration – yearly (historical average)	# of OTs that migrate externally (i.e., to another country) to/and register for practice – yearly average of the last decade	Y									
		Retire-ment rates (historical average)	OTs that have retired per year in the last decade (e.g., yearly average)	Y									
		Retire-ment rates (planned)	OTs that will attain retirement	Y									

				Portugal										
Data Item						Data Source (if applicable)							Limitations	
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
			per year in the upcoming decade (e.g., yearly average)										

Portugal													
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
Workforce Production	OT Workforce Production and Influx, Total (Nation)	Graduates – yearly, total	total # of nationally trained OT graduates in the last decade (e.g., yearly average)	Y	Collected through institutional survey and reported by national entity	Y	RAIDES Survey (4)	Data computed from RAIDES Surveys from 12 academic years; Sum up number of total nationally graduate students/12 academic years: 1497/12 = 124.75 Information from indicator number 4 (final classifications distribution) to extract number of graduating students from all OT courses on the country from 2011/12 to 2022/23. Then, aggregate extracted data accordingly to indicator (e.g. total, per school, public/private)	Yearly	2023	125	RAIDES Survey data indicators (some) reported aggregated, which limits year by year analysis WFOT Education Programs – Portuguese OT courses were not approved at the same time (which scatters data collection on RAIDES Survey from approved years)	Lack of disaggregated data for OT in particular Statistical agencies and Portuguese immigration data is not granular when reporting how many foreign-trained professionals register to practice in specific health profession

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
													s in general and for OT and OT MH in specific Universities may have annual graduate data numbers stratified per OT, but not public-domain available, nor aggregate in national statistics under "OT"; available

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
													data are scattered
		Graduates – yearly,	# of nationally trained OT	Y	Collected through institutional	Y	RAIDES Survey (4)	Data computed from RAIDES Surveys from 12 academic years; Sum up	Yearly	2023	100		

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
		public school	graduates, public schools, in the last decade (e.g., yearly average)		survey and reported by national entity			number of total nationally graduate students from public schools/12 academic years: 1200/12 = 100 Information from indicator number 4 (final classifications distribution) to extract number of graduating students from all OT courses on the country from 2011/12 to 2022/23. Then, aggregate extracted data accordingly to indicator (e.g. total, per school, public/private)					
		Graduates – yearly, private school	# of nationally trained OT graduates, private schools (including not for profit), in the	Y	Collected through institutional survey and reported by national entity	Y	RAIDES Survey (4)	Data computed from RAIDES Surveys from 12 academic years; Sum up number of total nationally graduate students from private schools/12 academic years: 297/12 = 24.75 Information from indicator number 4 (final	Yearly	2023	25		

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
			last decade (e.g., yearly average)					classifications distribution) to extract number of graduating students from all OT courses on the country from 2011/12 to 2022/23. Then, aggregate extracted data accordingly to indicator (e.g. total, per school, public/private)					
		Graduates - yearly, WFOT-approved program	% of nationally trained OT graduates from WFOT-approved programs (vs total OT graduates, WFOT-approved or not) in the last decade (e.g., yearly average)	Y	Collected through institutional survey and reported by national entity	Y	WFOT Website (5)	Combined data from approved programmes and years (off note, Porto school was only approved in 2018; schools from Beja, Leiria and Alcoitão fit total 12 year data-span with WFOT Approved education programmes): ((890/12)+(309/6)) = 125.67. Equivalent to 100% ten year-span Information from indicator number 4 (final classifications distribution) to extract number of graduating students from all OT	Every 4 years	2025	100%		

Portugal														
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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
								courses on the country from 2011/12 to 2022/23. Then, aggregate extracted data accordingly to indicator (e.g. total, per school, public/private)					
		Immi-gration – yearly, total	# of OTs that migrate internally (i.e., from another country) to/and register for practice – yearly average of the last decade	Y									
	Attrition in the OT Workforce Production & Influx, Total (Nation)	Gradua-tion attrition	% of students that initiate but do not complete an OT program – yearly	Y								Scattered and irregular data collection and report that does not compute an item/indicator (e.g. ACSS 2018 report	No public-domain informatio n/data Informatio n not disaggreg

Portugal														
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			average of the last decade									only states that 5 OTs (1 from Belgium and 4 from Brazil) applied for recognition of qualifications) (6)	ated for OT
		Unfilled training spots (public)	% of entry-level OT training vacancies (public schools) that remain vacant / were not filled – yearly average of the last decade	Y									
		Immigration attrition	% of internationally trained OTs that apply for registering/	Y									

Portugal													
Data Item						Data Source (if applicable)						Limitations	
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
			licensing for practice yet failed to complete the process – yearly average of the last decade										
Workforce Quality	OT workforce with advanced education/ certification	Master-level (above entry-level)	% of OTs available for practice that have a master-level (above entry-level) education	Y	Collected through survey and reported by national association	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these 20% reported to have completed a master-level degree (n=193)	Irregularly	2023	20%	APTO Reported data dependent on National Survey volunteer answers (n) for OT workforce supply sample	Lack of disaggregated data by educational level (for "master or higher") and no national registry collects OT educational attainmen

Portugal													
Data Item						Data Source (if applicable)						Limitations	
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													t beyond entry-level or master's degree in OT profession in general and for specialization in MH in specific The number of PhD-trained OTs is projected to be relatively small relative to total OT workforce Many PhD-

Portugal													
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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
													trained OTs may be in academia, research, or part-time clinical practice, making "available for practice" definition ambiguous Lack of information on entry-level minimum requirements (potentially relevant

				Portugal										
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														for Framework as it differs substantially between countries)
		Professional Doctorate (above entry level)	% of OTs available for practice that have an occupational–therapy doctorate level – not meaning PhD (above entry–level) education	N										
		Master as entry level	% of OTs available for practice that have a master–level as entry–	N										

Portugal														
Data Item						Data Source (if applicable)							Limitations	
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator		Data Source Limitations (qualitative)	Other Limitations
			level education											
		Professional Doctorate as entry level	% of OTs available for practice that have an occupational -therapy doctorate level - as entry-level education	N										
		PhD level	% of OTs available for practice that have a PhD-level education	Y	Collected through survey and reported by national association	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these 2.8% reported to have completed a PhD-level degree (n=27)	Irregularly	2023	2.80%			
		Formal advanced specializati	% of OTs available for practice that	Y	Collected through survey and	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020	Irregular -ly	2023	0.10%			

Portugal													
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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
		on/credential/certification	have a formally recognized, advanced specialization/certification/fellowship/credential (above entry-level) for OT practice		reported by national association			registered Ots data (n=1836); from these, 966 answered the National Survey; from these 0.1% reported to have completed a formal advanced specilization (reported as postdoctoral degree) (n=1)					
OT Workforce Distribution, by Practice area and sector (Nation)	OT Workforce Distribution, by Societal Sector, Total (Nation)	Public Sector (Government-based)	% of OTs practising in the government-based or publically-administered settings	Y	Collected through institutional survey and reported by international federation	Y	WFOT Dashboard (9)	% of OTs on public sector	Irregularly	2024	45%	APTO Reported data dependent on National Survey volunteer answers (n) for OT workforce supply sample ACSS identifies OT as profession, but no data is provided on any indicator regarding OT in general or OT MH in specific (7)	No official database or quantitative dataset on OT distribution per sector nationwide per OT in general and OT MH in

Portugal														
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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
												INE Portuguese Classification of Occupations (2010) also identifies OT as profession, but provides no data indicators regarding OT in general or OT MH in specific (8) Data on OTs practising in government/public or private sectors with no information on how was computed/determined	specific No national registry captures OT employment outside clinical/academic settings. OTs in Portugal are commonly employed by the third sector (e.g. Private Institutions of Social Solidarity or Catholic

Portugal														
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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
													charitable organizations), but there is no data on OT workforce supply available for that
		Public Sector (Local or municipality)	% of OTs practising in the local public sector	Y									
		Private Sector (for profit)	% of OTs practising in the for-profit private sector	Y	Collected through institutional survey and reported by international federation	Y	WFOT Dashboard (9)	% of OTs on public sector	Irregularly	2024	55%		

				Portugal										
Data Item						Data Source (if applicable)							Limitations	
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
		Industry	% of OTs practising in the Industry sector (products)	Y									
		NGOs, social/not-for-profit, civil society	% of OTs practising in the NGOs, social/not-for-profit, and civil society sector	Y									

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
	OT Workforce Distribution, by Role, Total (Nation)	Practitioner (clinician, school-based OT), excluding self-employed	% of OTs practising that have employed or service-based practitioner roles, excluding self-employed (own companies)	Y								APTO Reported data dependent on National Survey volunteer answers (n) for OT workforce supply sample	No public-domain information /data Information not disaggregated for OT No data system found to track OT workforce supply in general and MH specific with mixed roles (e.g. clinical + administrative/academic)
		Self-employed	% of OTs practising that have	Y									

Portugal														
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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
		/entrepeneur	employed/entrepreneurial (operate own companies) roles, excluding regular clinical OT service to other companies										
		Scholar/academia (researcher, educator)	% of OTs available for practice that have academic roles	Y	Collected through survey and reported by national association	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these 1.45% answered to have academic roles (n = 14)	Irregularly	2023	1.45%		
		Managerial/Admnistrative	% of OTs available for practice that have employed managerial/	Y									

Portugal														
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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
			Administrative roles										
	OT Workforce Distribution, by practice area, Total (Nation)	Mental Health	% of OTs in clinical practice that work in mental health settings including pediatric and geriatric	Y	Collected through survey and reported by national association	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these n=17 stated to work on psychiatric rehabilitation clinics and n=64 on psychiatric hospitals, representing 8.39%	Irregularly	2023	8.39%	APTO Reported data dependent on National Survey volunteer answers (n) for OT workforce supply sample APTO Report based on known ACSS number of registered/licensed OTs (which is not the total raw number of Portuguese OTs)	Lack of data system and accurate estimation (that would require internal staffing data or provider data (eg. hospital, private clinic, and home-care provider)) APTO Survey report: on MH

Portugal													
Data Item						Data Source (if applicable)						Limitations	
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
													collects answers on psychiatric hospitals and psychiatric rehabilitation clinics, but no data collection or report on OT workforce in MH working on other sectors/roles or facilities related to MH and stratified, such as

Portugal														
Data Item						Data Source (if applicable)							Limitations	
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
													pediatric or geriatric mental health, community-based settings, technology, academia
		Physical Rehabilitation, post-	% of OTs in clinical practice that work in	Y	Collected through survey and reported by	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data	Irregular-ly	2023	25.16%		

Portugal														
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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
		acute or long-term	physical rehabilitation settings, post-acute or long-term, inpatient, outpatient, and home-based		national association			(n=1836); from these, 966 answered the National Survey; from these n=62 stated to work on Rehabilitation Centers, n=63 on Physical Rehabilitation Clinics and n=118 on Integrated continuing care, representing 25.16%					
		Geriatric, not health system	% of OTs in clinical practice that work in non-health system geriatric settings (e.g., nursing home, senior center, assisted living, Alzheimer's' programs)	Y	Collected through survey and reported by national association	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these n=102 stated to work on Residential Facilities for the Elderly, representing 10.56%	Irregular-ly	2023	10.56%		

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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
		Pediatric-healthcare (not school based, not social/educational)	% of OTs in clinical practice that work in pediatric/development settings (healthcare)	Y	Collected through survey and reported by national association	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these n=106 stated to work on development centers, representing 10,97%	Irregular-ly	2023	10.97%		
		School-based or learning disabilities	% of OTs in clinical practice that work in pediatric settings (school-based, learning disabilities/ development clinics)	Y	Collected through survey and reported by national association	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these n=105 stated to work on schools and n=206 on special education, representing 32.19%	Irregular-ly	2023	32.19%		
		Acute care	% of OTs in clinical practice that	Y	Collected through survey and	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from	Irregular-ly	2023	10.97%		

				Portugal										
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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
			work in acute-care settings or units		reported by national association			these, 966 answered the National Survey; from these n=106 stated to work on physical medicine and rehabilitation hospitals and units, representing 10,97%					
		Adult Intelle-ctual/ Develop-ment Desabilites	% of OTs in clinical practice that work in Adult Intellectual/ Developmen t Disability contexts	Y									

Portugal														
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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
		Assistive tecnho-logy	% of OTs in clinical practice that work in assistive technology contexts, including industry	Y	Collected through survey and reported by national association	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these n=2 stated to work on assistive products, representing 0.21%	Irregular-ly	2023	0.21%		
		Comnu-nity-based	% of OTs in clinical practice that work in community services (social care, municipalities, civic centers)	Y	Collected through survey and reported by national association	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these n=24 stated to work on assistive products, representing 2.48%	Irregular-ly	2023	2.48%		

Portugal													
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Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
		Other or Emergent areas	% of OTs in clinical practice that work in emergent practice areas (e.g. primary care, prisons, disability advocacy, occupational health etc.), stratify as available	Y	Collected through survey and reported by national association	Y	APTO Report (3)	APTO estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; from these n=24 stated to work on primary care, n=6 on prisons, n=29 on home intervention and n=2 on educational training companies, representing 6.31%	Irregular-ly	2023	6.31%		
Geogra-phic Distri-bution, Mappa-ble	OT Workforce Supply Distribution (practising), by geography	Large Region, State, or Regional Aggregation of States	# of practising OTs in each region, per 10,000 head of population of each region	Y	Collected through survey and reported by national association	Y	Population total (1) APTO Report (3)	APTO Report (2) has data on province/district survey answers. Granular data from province/district can be grouped into large regions indicators. Then, combine it with population data by region per year (INE /	Irregularl y	2023	Mappa ble	No regional breakdown data available Lack of data to determine equitable distribution and access to OT workforce supply services in general and OT MH in	

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
								PORDATA) to compute per 10,000 heads of population per region				particular across regions Distribution is likely uneven (i.e. higher concentration in urban and suburban areas (e.g. Porto or Lisbon) due to availability of healthcare services, training and academic programs No data collection on OT workforce with granularity APTO Reported data dependent on National Survey volunteer answers (n) for OT workforce supply sample	
		Province/ District	# of practising	Y	Collected through	Y	Population total (1)	APTO – Report on the National Survey	Irregularly	2023			

Portugal														
Data Item						Data Source (if applicable)							Limitations	
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
			OTs in each province/district, per 10,000 head of population of each province/district		survey and reported by national association		APTO Report (3)	conducted in 2023 estimates total number of OTS based on ACSS 2020 registered Ots data (n=1836); from these, 966 answered the National Survey; participants provided answers regarding district where they work; Therefore, data can be used to calculate number of OTs working in each district, per 10,000 heads of population.					
		County Level	# of practising OTs in each county, per 10,000 head of population of each county	Y									

				Portugal										
Data Item						Data Source (if applicable)							Limitations	
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator		Data Source Limitations (qualitative)	Other Limitations
		Rural areas, all combined	# of practising OTs in all rural areas, per 10,000 head of population of all rural areas	Y										
		Rural areas, each	# of practising OTs in each rural area, per 10,000 head of population of each rural area	Y										
		Under-served (Formal designa-tion), all combined	# of practising OTs in all underserved areas (health workforce-shortage Area,	Y										

Portugal														
Data Item						Data Source (if applicable)						Limitations		
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
			medically underserved or equivalent), per 10,000 head of population of all underserved areas										
		Under-served (Formal desi-gnation), each	# of practising OTs in each underserved area (health workforce-shortage Area, medically under-served or equivalent), per 10,000 head of population of each	Y									

Portugal														
Data Item						Data Source (if applicable)						Limitations		
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
			underserved area										
	Optional: Geographic stratification of the OT workforce supply, quality and distribution data by each construct and item above												
	OT Workforce Production Distribution, by geography	Gradua-tion, by large region, state of aggregatio n of states	# of nationally trained OT graduates in the last decade (e.g., yearly average) in each region, per 10,000 head of population of each region	Y	Collected through institutional survey and reported by national entity	Y	Population total (1) RAIDES Survey (4)	Granular data from province/district Portuguese Higher Education Data and Statistics informed by RAIDES Survey, grouped into large regions (RAIDES Survey indicator 4 (final classifications distribution) – extract number of graduating students from all OT courses in the country from 2011/12 to 2022/23. Then, aggregate extracted data accordingly to indicator (e.g. total, per school, public/private)				RAIDES Survey provides information from higher education institutions. Therefore, data on geographic regions, province/district can only be geographically tied to institutional locations Lack of public-domain available data on metrics related to graduates other than college attendance (i.e.	

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
								and cross data with Portuguese administrative regions. Then, combine it with population data by region per year (INE / PORDATA) to compute per 10,000 heads of population per region				students' origin, geographical location where they intend to (or already) work, live) Vacancy fill rates (if available) are not stratified. No OT in general and OT MH in particular programs have specific vacancy data available (e.g. no stratification on public vs private / entry level vs postgraduate) Lack of longitudinal data on trends over time (both on supply/distributio n and on geographic data) Lack of data granularity	

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
												consistency. Even if available, lack of broad collection guidelines/structure	
		Gradua-tion, Province/ District	# of nationally trained OT graduates in the last decade (e.g., yearly average) in each province/district, per 10,000 head of population of each province/district	Y	Collected through institutional survey and reported by national entity	Y	Population total (1) RAIDES Survey (4)	Granular data from province/district Portuguese Higher Education Data and Statistics informed by RAIDES Survey, (RAIDES Survey indicator 4 (final classifications distribution) – extract number of graduating students from all OT courses in the country from 2011/12 to 2022/23. Then, aggregate extracted data accordingly to indicator (e.g. total, per school, public/private) and cross data with Portuguese					

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
								administrative regions. Then, combine it with population data by region per year (INE / PORDATA) to compute per 10,000 heads of population per region					
		Graduation attrition, by large region, state of aggregation of states	% of students that initiate but not complete an OT program by region – yearly average of the last decade, per 10,000 head of population of each region	Y									

Portugal														
Data Item				Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source (if applicable)					**VALUE** item/ indicator	Limitations	
Domain	Subdomain	Construct	Item / Indicator			Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available		Data Source Limitations (qualitative)	Other Limitations
		Gradua-tion attrition, by Province/ District	% of students that initiate but not complete an OT program by province/dis trict – yearly average of the last decade, per 10,000 head of population of each province/dis trict	Y									

Portugal														
Data Item						Data Source (if applicable)						Limitations		
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) – public domain/accessible – Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
		Unfilled training spots (public), by large region, state of aggregation of states	% of entry-level OT training vacancies (public schools) that remain vacant / were not filled – yearly average of the last decade, per 10,000 head of population of each region	Y									
		Unfillled training spots	% of entry-level OT training	Y									

				Portugal										
Data Item						Data Source (if applicable)							Limitations	
Domain	Subdomain	Construct	Item / Indicator	Construct Applicable to Nation (Y/N)	Notes on: Construct Applicable	Data Source(s) - public domain/accessible - Available (Y/N/P)	Which data source(s): type and name, either alone or to be computed in combination	Notes (any): on the data sources and the need for combination/computing data	Update frequency/timing (e.g., continuous, yearly, every five years, never)	Last year of data available	**VALUE** item/ indicator	Data Source Limitations (qualitative)	Other Limitations
		(public), by Province/ Distrcit	vacancies (public schools) that remain vacant / were not filled - yearly average of the last decade, per 10,000 head of population of each province/district										

1 Population total (n) - Total Portuguese Population Estimates from INE and PORDATA (2024). Available at: https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_indicadores&contecto=pi&indOcorrCod=0012903&selTab=tab0 / https://www.pordata.pt/pt/estatisticas/populacao/populacao-residente/populacao-residente-por-sexo-e-grupo-etario?_gl=1*8g25ll*_up*MQ..*_ga*MTkwNzU0NTgyMS4xNzU3OTcyMjM2*_ga_HL9EXBCVBZ*czE3NTc5NzIyMzYkbzEkZzEkdDE3NTc5NzI1MzIkajYwJGwwJGg

2 WFOT Data - country profile with official data for Portugal: total number of Ots (2025). Available at https://wfot.org/member-organisations/portugal-associacao-portuguesa-de-terapeutas-ocupacionais

3 APTO Report - on the Characterization of Occupational Therapists in Portugal - National Survey (2023). Available at: https://www.apto.pt/documentos-de-interesse/

4 RAIDES Survey – Institutional Survey conducted by Portuguese Universities. Collected and managed at national level by Portuguese Education and Science Statistics Entity . Available at: https://infocursos.medu.pt/bds.asp and https://www.dgeec.medu.pt/

5 WFOT Website – Approved Education Programs – Results for Portugal (n=4),(2025). Available at: https://wfot.org/education/wfot-approved-education-programmes?status=Ongoing&country=Portugal

6 ACSS 2018 report. Available at: https://www.acss.min-saude.pt/wp-content/uploads/2016/10/Relatorio_Contas_MS-SNS_2018.pdf

7 ACSS Professional Categories. Available at: https://www.acss.min-saude.pt/category/profissionais/cedulas-profissionais-profissionais/

8 INE Portuguese Classification of Occupations (2010). Available at: https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_publicacoes&PUBLICACOESpub_boui=107961853&PUBLICACOESmodo=2&xlang=pt

9 WFOT Dashboard – Global overview of the OT profession. Responses received from each WFOT Member Organization or the WFOT Delegate in 2023. Dashboard was released in May 2025. Available at: https://hr-project.wfot.org/

Supplementary Material 6: RAIDES Survey Data Used to Compute Framework Checklist Indicators

RAIDES SURVEY ACADEMIC YEAR(S)	REPORTED IN (YEAR)	ACADEMIC INSTITUTION	COLLEGE	SECTOR	TYPE	DEGREE	GRADUATE STUDENTS (n=2 years, according to Portuguese RAIDES
2011/12 & 2012/13	2015	Instituto Politécnico de Beja	Escola Superior de Saúde	Public	Polytechnic	Occupational Therapy Bachelr's Degree	0
2011/12 & 2012/13	2015	Instituto Politécnico de Leiria	Escola Superior de Saúde de Leiria	Public	Polytechnic	Occupational Therapy Bachelr's Degree	26
2011/12 & 2012/13	2015	Instituto Politécnico do Porto	Escola Superior de Tecnologia da Saúde do Porto	Public	Polytechnic	Occupational Therapy Bachelr's Degree	96
2011/12 & 2012/13	2015	Escola Superior de Saúde do Alcoitão	Escola Superior de Saúde do Alcoitão	Private	Polytechnic	Occupational Therapy Bachelr's Degree	70
2013/14 & 2014/15	2017	Instituto Politécnico de Beja	Escola Superior de Saúde	Public	Polytechnic	Occupational Therapy Bachelr's Degree	25
2013/14 & 2014/15	2017	Instituto Politécnico de Leiria	Escola Superior de Saúde de Leiria	Public	Polytechnic	Occupational Therapy Bachelr's Degree	74
2013/14 & 2014/15	2017	Instituto Politécnico do Porto	Escola Superior de Saúde	Public	Polytechnic	Occupational Therapy Bachelr's Degree	97
2013/14 & 2014/15	2017	Escola Superior de Saúde do Alcoitão	Escola Superior de Saúde do Alcoitão	Private	Polytechnic	Occupational Therapy Bachelr's Degree	72
2015/16 & 2016/17	2019	Instituto Politécnico de Beja	Escola Superior de Saúde	Public	Polytechnic	Occupational Therapy Bachelr's Degree	47
2015/16 & 2016/17	2019	Instituto Politécnico de Coimbra	Escola Superior de Tecnologia da Saúde de Coimbra	Public	Polytechnic	Occupational Therapy Bachelr's Degree	0
2015/16 & 2016/17	2019	Instituto Politécnico de Leiria	Escola Superior de Saúde de Leiria	Public	Polytechnic	Occupational Therapy Bachelr's Degree	80
2015/16 & 2016/17	2019	Instituto Politécnico do Porto	Escola Superior de Saúde	Public	Polytechnic	Occupational Therapy Bachelr's Degree	105
2015/16 & 2016/17	2019	Escola Superior de Saúde do Alcoitão	Escola Superior de Saúde do Alcoitão	Private	Polytechnic	Occupational Therapy Bachelr's Degree	36
2017/2018 &	2021	Instituto Politécnico de Beja	Escola Superior de Saúde	Public	Polytechnic	Occupational Therapy Bachelr's Degree	45

2018/2019							
2017/2018 & 2018/2019	2021	Instituto Politécnico de Leiria	Escola Superior de Saúde de Leiria	Public	Polytechnic	Occupational Therapy Bachelr's Degree	78
2017/2018 & 2018/2019	2021	Instituto Politécnico do Porto	Escola Superior de Saúde	Public	Polytechnic	Occupational Therapy Bachelr's Degree	110
2017/2018 & 2018/2019	2021	Escola Superior de Saúde do Alcoitão	Escola Superior de Saúde do Alcoitão	Private	Polytechnic	Occupational Therapy Bachelr's Degree	47
2019/2020 & 2020/21	2023	Instituto Politécnico de Beja	Escola Superior de Saúde	Public	Polytechnic	Occupational Therapy Bachelr's Degree	37
2019/2020 & 2020/21	2023	Instituto Politécnico de Leiria	Escola Superior de Saúde de Leiria	Public	Polytechnic	Occupational Therapy Bachelr's Degree	77
2019/2020 & 2020/21	2023	Instituto Politécnico do Porto	Escola Superior de Saúde	Public	Polytechnic	Occupational Therapy Bachelr's Degree	102
2019/2020 & 2020/21	2023	Escola Superior de Saúde de Santa Maria	Escola Superior de Saúde de Santa Maria	Private	Polytechnic	Occupational Therapy Bachelr's Degree	0
2019/2020 & 2020/21	2023	Escola Superior de Saúde do Alcoitão	Escola Superior de Saúde do Alcoitão	Private	Polytechnic	Occupational Therapy Bachelr's Degree	46
2021/2022 & 2022/2023	2025	Instituto Politécnico de Beja	Escola Superior de Saúde	Public	Polytechnic	Occupational Therapy Bachelr's Degree	38
2021/2022 & 2022/2023	2025	Instituto Politécnico de Leiria	Escola Superior de Saúde de Leiria	Public	Polytechnic	Occupational Therapy Bachelr's Degree	66
2021/2022 & 2022/2023	2025	Instituto Politécnico do Porto	Escola Superior de Saúde	Public	Polytechnic	Occupational Therapy Bachelr's Degree	97

2021/2022 & 2022/2023	2025	Escola Superior de Saúde de Santa Maria	Escola Superior de Saúde de Santa Maria	Private	Polytechnic	Occupational Therapy Bachelr's Degree	0
2021/2022 & 2022/2023	2025	Escola Superior de Saúde do Alcoitão	Escola Superior de Saúde do Alcoitão	Private	Polytechnic	Occupational Therapy Bachelr's Degree	26

Supplementary Material 7: Contextual Country Variables Related to Demography, Population and Territory, Economic/Financial and Health-Economics/Financing System Indicators

Variable	Portugal	United States	World
Demography, Population and Territory			
Total population (no. of people)	10,459,806[a]	340,110,988[b]	
Territory–land (km^2)[c]	91,606	9,147,420	
% rural population (% of total population)[d]	32%	16%	42%
Economic/Financial			
Gross domestic product per capita (based on purchasing power parity in US dollars)[b]	US$ 50,617	US$ 85,810	US$ 24,248
Income Level *a*	High income	High income	
Gross National Income (US$/capita) *e*	US$26,620	US$ 83,660	US$ 13,439
Health-Economics/Financing System			
Current Health Expenditure Per Capita (US$/capita) f	US$2,744	US$12,434	US$1,236
Out-of-pocket health expenditure (% of current on health expenditure)[a]	30%	11%	17%
Domestic General Government Health Expenditure (%) g	15%	25%	

a Total Portuguese Population Estimates from PORDATA (2024). Available at: https://www.pordata.pt/pt

b The World Bank (2024). Available at: https://www.worldbank.org/ext/en/home. Accessed in September 2025

c World Bank. Land area (sq. km), 2022. Available at: https://data.worldbank.org/indicator/AG.LND.TOTL.K2?locations=PT-US

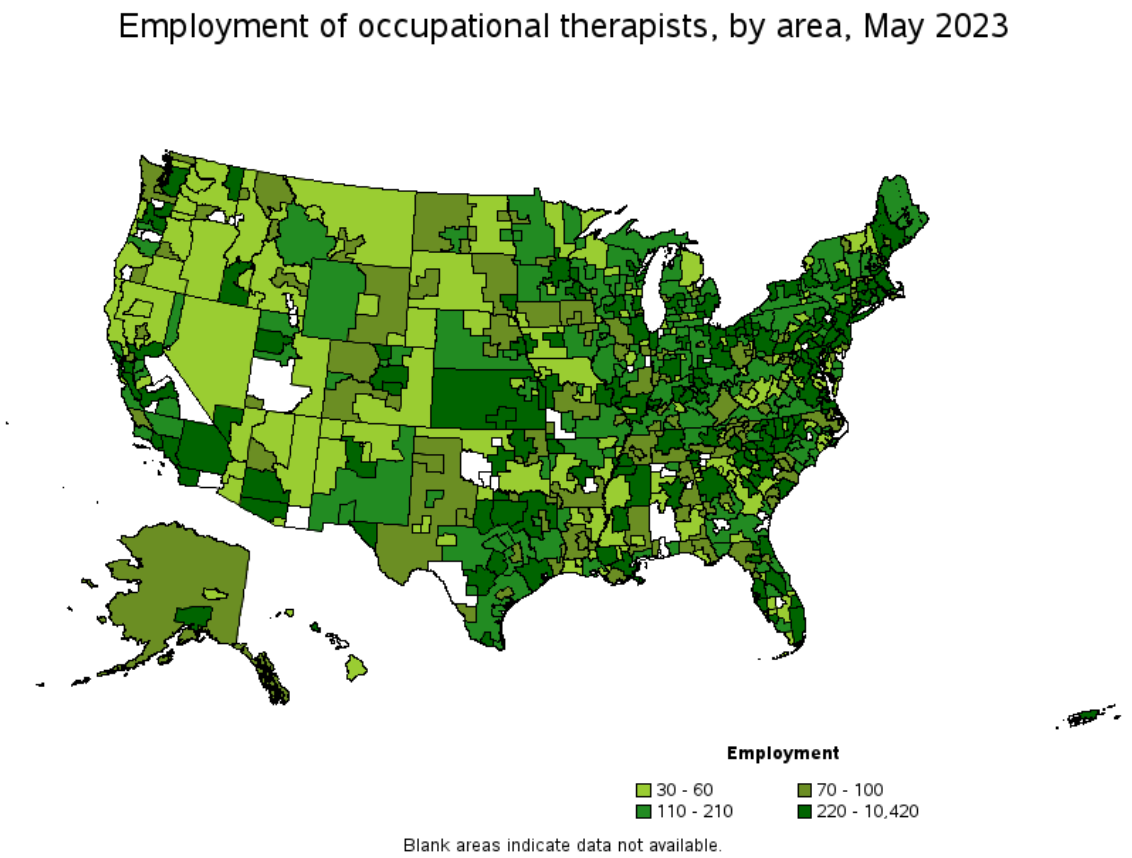
d World Bank. Rural population (% of total population), 2024. Available at: https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS

e World Bank. GNI per capita, Atlas method (current US$) 2024. Available at: https://data.worldbank.org/indicator/NY.GNP.PCAP.CD

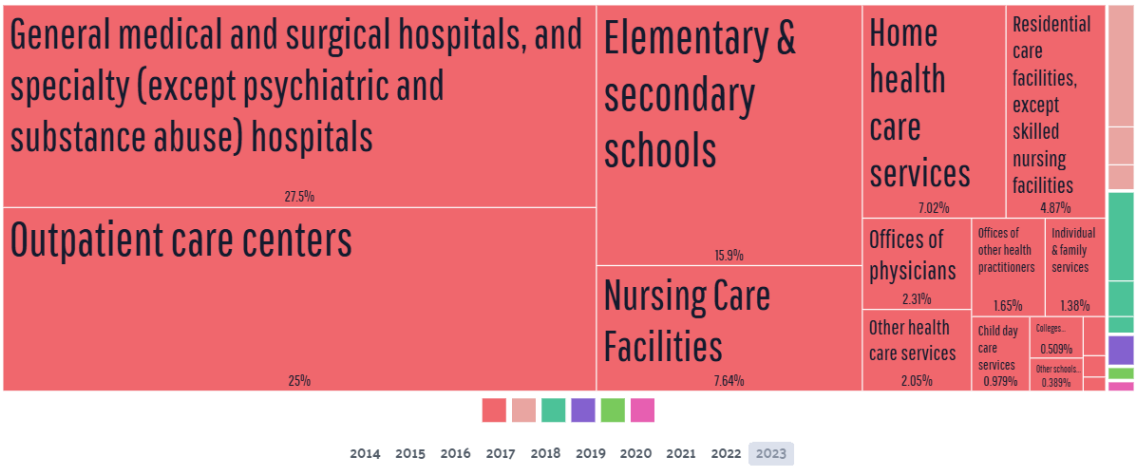
f World Bank. Current health expenditure per capita (current US$) 2021 [October 25, 2024]. Available from: https://data.worldbank.org/indicator/SH.XPD.CHEX.PC.CD?view=chart.

g World Bank. Domestic general government health expenditure (% of current health expenditure) 2022. Available at: https://data.worldbank.org/indicator/SH.XPD.GHED.CH.ZS.

Supplementary Material 8: USA Examples of Spatial Data Mapping and Data Visualization for the OT Workforce Supply and Distribution (per geographic region and sector, 2023)

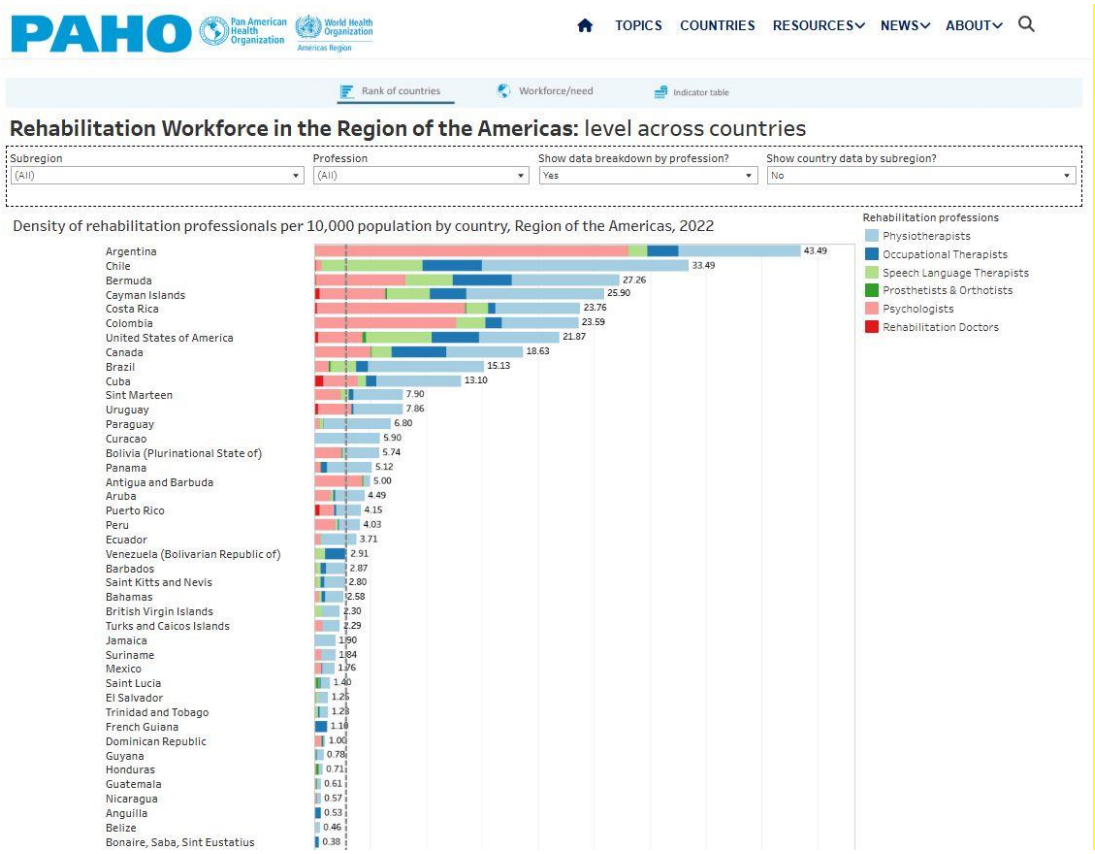


Retrieved from (*United States Department of Labor*, 2023)



Retrieved from (Data USA, 2025)

Supplementary Material 9: PAHO Data portal Example on OT and other Rehabilitation Professionals Database



Retrieved from: (*PAHO*, n.d.)

Artificial Intelligence Statement

For this dissertation, artificial intelligence (AI) tools were used in limited and explicitly defined ways (i.e., as supportive, not substantive tools). All analytical decisions, data interpretation, and final content remain the sole responsibility of the author. No AI systems were used to generate or alter primary data. Tools and purposes of use:

ChatGPT (OpenAI) and Mistral AI:
Assisted with synthesis and refinement of written text.
Supported editing for clarity and conciseness.
Helped in rephrasing to improve flow while preserving meaning.
Supported the iterative edition of preliminary draft structures (e.g., outlines, section transitions).

QuillBot:
Used selectively for text refinement and paraphrasing.
Aimed at reducing redundancy and ensuring clarity of expression.

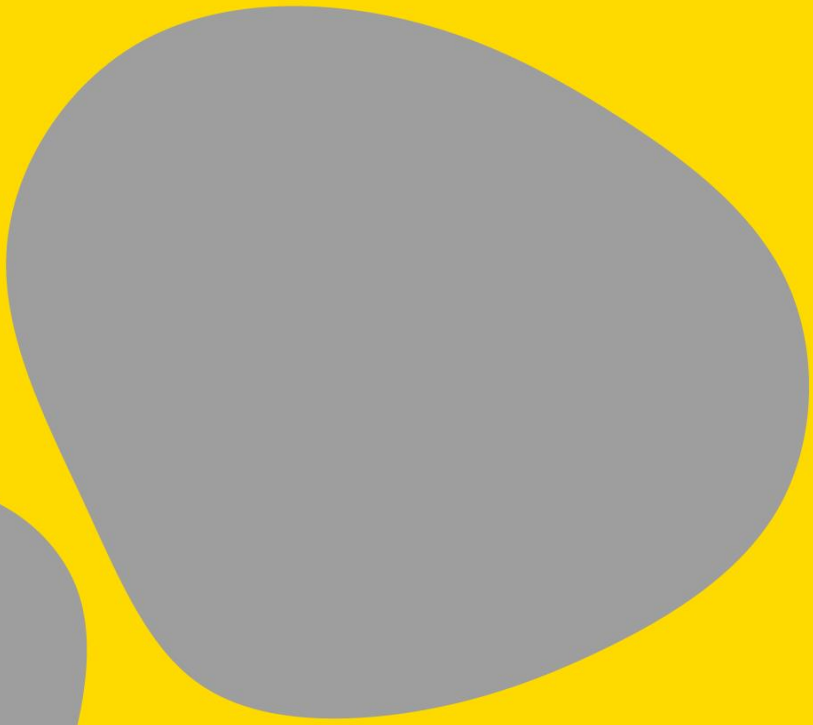
Research Rabbit and Semantic Scholar:
As outlined in the Methods section, these AI-driven tools were used to assist in bibliographic research.
Helped identify relevant literature and visualize citation networks.
Facilitated discovery of additional sources related to core keywords and themes.

Boundaries of AI use:
AI tools did not generate original research findings or shape analytical conclusions.
AI outputs were critically reviewed, verified, and revised by the author.
All substantive decisions regarding data analysis, interpretation, and argumentation were made independently by the author.

The responsibility for the accuracy, integrity, and originality of the thesis lies fully with the author.

P.PORTO

ESCOLA SUPERIOR DE SAÚDE



M

MASTER'S DEGREE

OCCUPATIONAL THERAPY