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Universidade Nova de Lisboa
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HIV epidemic and national response in Portugal under financial constraints
and a comparative analysis with three Southern European countries

Gonçalo Figueiredo Augusto

**DISSERTAÇÃO PARA A OBTENÇÃO DO GRAU DE DOUTOR EM SAÚDE
INTERNACIONAL ESPECIALIDADE DE POLÍTICAS DE SAÚDE E DESENVOLVIMENTO**

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- **Augusto GF**, Aldir I, Bettencourt J, Dias SF, Abrantes A, Martins MRO. Preventing HIV under financial constraints: The 2011-12 reform of the Portuguese HIV/AIDS Programme. *Health Policy.* 2020;124(4):339-344.
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- **Augusto GF**, Hodges-Mameletzis I, Karanikolos M, Abrantes A, Martins MRO. HIV prevention and treatment in Southern Europe in the aftermath of bailout programmes. *Eur J Public Health.* 2020 May 3. pii: ckaa062.
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*“Au milieu de l’hiver, j’apprenais enfin qu’il y
avait en moi un été invincible.”*

Albert Camus, *Retour à Tipasa*.

In: *Noces suivi de L’été*: Gallimard, 1959

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RESUMO

Introdução: A presente agenda global de saúde para o VIH/SIDA visa mobilizar os países de todo o mundo para enfrentar as principais lacunas na resposta ao VIH. A ONUSIDA estabeleceu metas ambiciosas para o tratamento do VIH para serem atingidas até 2020. A OMS recomenda que abordagens baseadas na evidência e estratégias inovadoras, incluindo a profilaxia pré-exposição (PrEP) e o autoteste de VIH, façam parte das respostas nacionais à epidemia de HIV. Este compromisso global sem precedentes foi lançado após uma grave crise financeira global, que forçou muitos países a reduzir a despesa em saúde. Este estudo teve como objetivo analisar os potenciais efeitos desses constrangimentos financeiros na resposta e políticas nacionais para o VIH em Portugal, no contexto de outros países do sul da Europa que também receberam programas de assistência financeira.

Métodos: Para os objetivos deste estudo, foram realizadas quatro análises, utilizando diferentes abordagens metodológicas: a) Foi utilizado um modelo hierárquico de regressão de Poisson com efeitos aleatórios para analisar a relação entre o tempo de internamento e variáveis do doente, dos cuidados de saúde e do contexto, utilizando dados nacionais de 20,361 internamentos ocorridos entre 2009 e 2014 em 41 hospitais públicos em Portugal; b) Para o período 2009-2018, foram analisados os resultados dos programas de prevenção do VIH em Portugal: apoio financeiro a organizações privadas sem fins lucrativos, programa de troca de seringas, teste rápido de VIH e distribuição de materiais preventivos; c) Para o período 2005-2017, foram analisados os dados de vigilância de do VIH/SIDA em Portugal, usando análise descritiva e modelos de regressão linear para testar tendências nos novos diagnósticos de VIH e SIDA e diagnósticos tardios de VIH; d) Foram examinados e comparados um conjunto de indicadores de VIH no Chipre, Grécia, Portugal e Espanha, países que receberam assistência económica da União Europeia durante a crise financeira.

Resultados: Este estudo constatou que o tempo de internamento dos doentes com VIH/SIDA entre 2010 e 2014 nos hospitais públicos portugueses foi significativamente menor em comparação com 2009, e que diversas variáveis, incluindo sexo feminino, internamento urgente, mortalidade hospitalar, pneumonia pneumocystis, hepatite C, e o rácio de liquidez do hospital contribuiu para a diminuição do tempo de tempo de internamento dos doentes com VIH/SIDA entre 2009 e 2014. Este estudo também mostrou que, apesar dos cortes transitórios de despesa em 2012-13, o Programa Nacional para a Infecção VIH e SIDA conseguiu melhorar a sua eficiência e manter as suas actividades principais, graças à priorização de gastos na expansão do teste de VIH e a um forte envolvimento com organizações da sociedade civil. A análise das tendências do VIH entre 2005 e 2017 mostrou uma redução significativa das novas infecções em todos os grupos, excepto nos homens que têm sexo com homens (HSH), onde foi observada uma tendência de aumento não significativa. O diagnóstico tardio ainda é comum em todos os grupos de transmissão, excepto nos HSH, enquanto a aquisição de VIH no estrangeiro é relevante entre pessoas nascidas fora de Portugal, excepto entre utilizadores de drogas. A análise comparativa com outros três países do sul da Europa que receberam assistência económica mostra que Portugal é o único país que implementou PrEP e autoteste de VIH. Portugal atingiu as metas 90-90-90 da ONUSIDA para o tratamento do VIH em 2017.

Conclusão: Os resultados deste estudo mostram que os constrangimentos financeiros com que Portugal se defrontou não prejudicaram o progresso do país em relação à eliminação da SIDA até 2030, tornando Portugal um estudo de caso interessante no contexto europeu.

Palavras-chave: VIH; SIDA; Políticas da saúde; Serviços de saúde; Austeridade

ABSTRACT

Background: The current global health agenda for HIV/AIDS aims to mobilise countries worldwide to address major gaps in HIV response. UNAIDS has set ambitious targets to HIV treatment to be met by 2020. WHO recommends that evidence-based approaches and innovative strategies, including pre-exposure prophylaxis (PrEP) and HIV self-testing (HIVST), should be part of countries' response to the HIV epidemic. This unprecedented call for a global commitment against HIV/AIDS came in the aftermath of a severe global financial crisis that forced many countries to cut health care spending. This study aimed to analyse the potential effects of these financial constraints on the response to HIV/AIDS and associated national policies in Portugal, in the context of other Southern European countries that also received bailout programmes.

Methods: For the purposes of this study, four analyses were conducted, using different methodological approaches: a) Hierarchical Poisson regression model with random effects was used to analyse the relation between length of stay and patient, treatment and setting characteristics, using national data from 20,361 hospitalizations occurring between 2009 and 2014 in 41 public hospitals in Portugal; b) For the period 2009-2018, we analysed the outcomes of HIV prevention programmes in Portugal which included: financial support to private non-for-profit organisations; syringe exchange programme; HIV rapid testing; and distribution of preventive materials; c) For the period 2005-2017, we analysed Portuguese HIV/AIDS surveillance data, using descriptive analysis and linear regression models to test for trends in new HIV and AIDS diagnoses and late HIV diagnoses; d) We examined and compared a set of HIV indicators in Cyprus, Greece, Portugal and Spain, countries which received economic assistance from the European Union during the financial crisis.

Results: This study found that length of stay of HIV/AIDS patients in Portuguese public hospitals between 2010 and 2014 was significantly shorter compared to 2009, and that a number of variables, including being female, urgent admission, in-hospital mortality, pneumocystis pneumonia, hepatitis C, and hospital's current ratio contributed to the decrease of HIV/AIDS patients' length of stay between 2009 and 2014. Findings also showed that, despite transitory spending cuts in 2012-13, the Portuguese HIV/AIDS Programme was able to improve its efficiency and sustain its core activities, thanks to prioritisation of spending in HIV testing expansion and a strong engagement with civil society organisations. The analysis of HIV trends between 2005 and 2017 has shown a significant decline in new HIV infections in all groups, except in men who have sex with men, where a non-significant increase trend was observed. Late diagnosis remains common in all transmission groups, except in MSM, while foreign acquisition of HIV is relevant among foreign-born persons, except in people who inject drugs. The comparative analysis with other three Southern European countries that received economic bailout assistance shows that Portugal is the only country that implemented both PrEP and HIVST. Portugal met the UNAIDS 90-90-90 targets for HIV treatment in 2017.

Conclusion: Results from this study show that financial constraints experienced in Portugal have not hampered the country's progress towards eliminating AIDS by 2030, making Portugal an interesting case study in the European context.

Keywords: HIV; AIDS; Health policy; Health services; Austerity

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LIST OF ACRONYMS

ACSS	Central Administration of the Health System [<i>Administração Central do Sistema de Saúde</i>]
ADIS	Support Development Intervention AIDS [<i>Apoio Desenvolvimento Intervenção SIDA</i>]
AIDS	Acquired Immunodeficiency syndrome
ANF	National Association of Pharmacies [<i>Associação Nacional das Farmácias</i>]
ART	Antiretroviral therapy
CAD	HIV Testing and Counselling Centres [<i>Centros de Aconselhamento e Detecção</i>]
CBO	Community-based organisation
CD4	Cluster of differentiation 4
DGS	Directorate-General of Health [<i>Direção-Geral da Saúde</i>]
DRG	Diagnosis Related Groups
ECB	European Central Bank
ECDC	European Centre for Disease Prevention and Control
EEA	European Economic Area
EFAP	Economic and financial adjustment programme
EU	European Union
GDP	Gross Domestic Product
HAART	Highly Active Antiretroviral Therapy
HIV	Human immunodeficiency virus
HIVST	HIV self-testing

ICD-9	International Classification of Diseases – 9th [ninth] revision
IMF	International Monetary Fund
INSA	National Institute of Health [<i>Instituto Nacional de Saúde Doutor Ricardo Jorge</i>]
IQR	Interquartile range
LOS	Length of stay
MDC	Major Diagnostic Category
MSM	Men who have sex with men
MoU	Memorandum of Understanding
NGO	Non-governmental organisation
NHS	National Health Service (Portugal)
PEPFAR	President’s Emergency Plan for AIDS Relief
PLHIV	People living with HIV
PrEP	Pre-exposure prophylaxis
PWID	People who inject drugs
SEP	Syringe Exchange Programme
SIPAF	Integrated System for Health Financial Support Programmes [<i>Sistema Integrado de Programas de Apoio Financeiro em Saúde</i>]
UN	United Nations
UNAIDS	Joint United Nations Programme on HIV/AIDS
UK	United Kingdom of Great Britain and Northern Ireland
USA	United States of America
VHI	Voluntary Health Insurance
WHO	World Health Organization

1. GENERAL INTRODUCTION

This dissertation is presented in three main chapters and consists of a set of four manuscripts that have been published or are currently under review. Each manuscript was written according to the format of the journal in which it was published or intended to be published. The first chapter (*General Introduction*) is divided into three subsections, which provide the background of the study, specify the study's aims and objectives, and outline the methods.

The second chapter (*Results*) is divided into four subsections, each one corresponding to a research paper.

The third chapter (*General Discussion and Conclusions*) summarises the main findings and contributions of the dissertation, including its limitations, outlines the main policy implications, and draws the conclusions.

1.1. Background

1.1.1. Rationale of the study

HIV remains a major global health concern. At the end of 2018, an estimated 37.9 [32.7-44.9] million people worldwide were living with HIV and 1.7 million people were newly infected in 2018 globally [1]. In the WHO European Region, more than 2 million people were affected by HIV and nearly 160,000 were diagnosed with HIV in 2017, including 25,000 in the European Union/European Economic Area (EU/EEA) [2].

The goal of ending the AIDS epidemic by 2030 emerged in 2015 with the United Nations Agenda for Sustainable Development [3], but the momentum generated by the Millennium Development Goals was further developed with the WHO Global Health Sector Strategy on HIV for 2016-2021 [4] and with the Action Plan for the Health Sector Response to HIV in the WHO European Region [5]. Additionally, in 2015 the Joint United Nations Program on HIV/AIDS (UNAIDS) launched ambitious treatment targets to accelerate the end of the AIDS epidemic: by 2020, 90% of all people living with HIV will know their HIV status; 90% of all people with diagnosed HIV infection will receive

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sustained antiretroviral therapy, and 90% of all people receiving antiretroviral therapy will have viral suppression [6].

This new global health agenda for HIV was launched in the aftermath of the global economic crisis, the so called Great Recession, which began in the United States in mid-2008. The crisis hit Europe severely in 2009 and generated a sovereign debt crisis that shook European Union Member States, particularly in the Eurozone [7]. The immediate response from several countries was the adoption of austerity measures, with cuts in public spending and tax raises. However, the vulnerability of some countries and the increasing difficulty in financing their economies led to several bailouts by the European Union (EU), European Central Bank (ECB) and the International Monetary Fund (IMF). This was the case for Greece, Ireland, Portugal, Spain and Cyprus [8]. These and other EU governments consequently have reduced spending dramatically, including for health expenditure. The economic crisis and the austerity period that followed have had political, financial, economic and social consequences that, ten years after, are still visible today. The global economic crisis and its possible consequences on HIV epidemics and national HIV policies, particularly in developing countries [9], have prompted deep concern from UNAIDS. Fears of limited access to treatment, strong risk of cuts in prevention programmes and possible reduction in donor assistance were highlighted as the main potential effects of the economic crisis in low-income countries [9].

In Europe, the effects of the global economic crisis on the spread and control of communicable diseases was also subject of concern [10]. Many countries have cut budgets devoted to control and prevent infectious diseases, including HIV [11]. As investments in the HIV response were cut, in 2011 HIV outbreaks among people who inject drugs (PWID) were reported in Greece and Romania [12,13].

HIV remains an important public health issue and Portugal is one of the EU/EEA countries with the highest number of newly diagnosed HIV cases [14]. The country's commitment to steadily reduce HIV incidence and reach international standards on HIV treatment has not changed in the face of the economic crisis. However, the influence of the crisis and the austerity measures implemented in Portugal on the country's response to the HIV epidemic have not yet been studied. People living with HIV (PLHIV) are a vulnerable group in constant need of appropriate and effective care, which is why the

analysis of how the austerity measures imposed during the economic assistance programme to Portugal may have shaped the country's HIV response and HIV policies constitutes a relevant case study.

1.1.2. The global agenda for HIV/AIDS

HIV/AIDS has become a global health priority [15]. What started at the very beginning as a small number of cases in homosexual men in California and New York, turned very quickly into a global epidemic, spreading all over the world, but disproportionately affecting Sub-Saharan Africa [16]. The discovery of highly active antiretroviral therapy (HAART) in the mid-1990s helped to revert the increasing number of AIDS-related deaths in high-income countries, but mortality in low and middle-income countries continued to increase due to lack of access to ART [16]. By the beginning of the new millennium an estimated 34.3 million people were living with HIV/AIDS worldwide, 24.5 million of which in Sub-Saharan Africa [17,18]. Since the beginning of the AIDS epidemic, an estimated 18.8 million people have lost their lives, including 3.8 million children [17].

At the Millennium Summit, in September 2000, 189 member states of the United Nations adopted the Millennium Declaration, an unprecedented agenda to tackle extreme poverty in its many dimensions [19]. This agenda was translated into the Millennium Development Goals, which consisted of eight goals with measurable targets and clear deadlines that became the global development framework until 2015 [20]. HIV/AIDS was included in the Goal 6 (*Combat HIV/AIDS, malaria and other diseases*) and global efforts it made possible to decrease new HIV infections by 40% between 2000 and 2013 (*Target 6.A – Have halted by 2015 and begun to reverse the spread of HIV/AIDS*) and to expand access to antiretroviral therapy (ART) to 13.6 million people living with HIV (PLHIV) in 2014, comparing to only 800,000 people in 2003 (*Target 6.B – Achieve, by 2010, universal access to treatment for HIV/AIDS for all those who need it*) [20].

In June 2001, the United Nations (UN) General Assembly Special Session on HIV/AIDS endorsed a historic Declaration of Commitment on HIV/AIDS, where heads of State and representatives of governments agreed to prioritise the fight against HIV/AIDS and to provide prevention, treatment and care for all those suffering with the epidemics [21]. The meeting was a major milestone in the global response to HIV/AIDS and was renewed

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in 2011 [22]. As a result of this unprecedented commitment, the Global Fund to fight AIDS, Tuberculosis, and Malaria was created in 2002 to finance AIDS activities in developing countries [16]. One year later, in 2003, US President G.W. Bush announced the President's Emergency Plan for AIDS Relief (PEPFAR), which allocated billions of dollars to countries most affected by AIDS [16].

Created in 1994, the Joint United Nations Program on HIV/AIDS (UNAIDS) coordinated the efforts at the global level to tackle HIV/AIDS, but the 21st century brought several new actors to the field. The Millennium Development Goals catalysed the creation of numerous global health initiatives, many of them focused on HIV/AIDS [23]. These global health initiatives could be bilateral (eg PEPFAR) or multilateral agencies (eg The World Bank Multinational AIDS Programme) or even public-private partnerships (eg The Global Fund) and shared similar approaches in the application of funds targeting HIV/AIDS control in several countries and world regions [24]. When the 2008 economic crisis threatened the global HIV/AIDS response, and as donors were cutting funding to Global Health Initiatives, the role of non-governmental organisations, such as the Bill and Melinda Gates Foundation, was crucial to maintain adequate funding to HIV programmes.

This unprecedented global response to the AIDS pandemic was successful in establishing multi-sectoral approaches involving several stakeholders and, thus, achieving a decline in HIV incidence and mortality [16]. Although there are arguments about the consequences of those “vertical” AIDS programmes on country health systems [23,25], collateral benefits include greater attention and funding for global health, especially for malaria and tuberculosis, and a strengthening of services for maternal and child health in some countries [26-28].

Several actions were taken to accelerate the global response to HIV/AIDS, including the *Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive*, launched in 2011 with the aim to reduce new HIV infections among children by 90% from the baseline in 2009 [29]. The Global Plan included 21 focus countries, that were home to nearly 90% of pregnant women living with HIV in need of services. By the end of 2015, 60% fewer children were newly infected with HIV annually compared to 2009 and over 2 million more pregnant women had started receiving lifesaving antiretroviral therapy [30].

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Important progress was made in the fields of HIV treatment and prevention. Since the mid-1990s, the introduction of HAART has changed the treatment of PLHIV, with the life expectancy of an HIV-infected individual under treatment approaching the same as an uninfected individual [31-33]. The availability of several effective ART regimens and the availability of generic drugs, which are more affordable, made it possible to dramatically expand the number of people receiving ART [1]. As a result, AIDS-related deaths have started to decline, first in the USA and Europe and then in low and middle-income countries [34]. Based on evidence of ongoing HIV replication on disease progression, the World Health Organization (WHO) recommended ART for all HIV-infected individuals, irrespective of their CD4 count [35]. This was an important step towards the control of the HIV epidemic. On the one hand, PLHIV should be linked and retained in care right after diagnosis, without having to wait for a deterioration of their immunological status to initiate ART; on the other hand, it was shown that ART use prevents transmission of HIV in discordant couples [36], meaning that offering ART to all individuals infected by HIV could reduce the risk of their sexual partners. Hence, delivering ART to all PLHIV has a dual advantage: it protects the health and well-being of individuals infected by HIV and prevents them from transmitting the infection to others. As viral load is the greatest risk factor for all transmission modes (sexual, blood, mother-to-child) [37], treatment as prevention is based on the fact that ART can reduce plasma and genital HIV viral load to undetectable levels (viral suppression), thereby reducing infectiousness [36].

HIV prevention strategies also witnessed major progress. Initially, the main prevention strategies were based on behavioural change (*eg* condom use, abstinence, reducing sexual partners) – with limited success [16], and harm reduction, which was highly effective in reducing HIV infections among PWID [38]. However, male circumcision was found to reduce susceptibility to HIV with an efficacy rate of 50 to 60% in three clinical trials [39-41]. Male circumcision has proven to be one of the most cost-effective HIV prevention interventions with high rates of community effectiveness in decreasing HIV incidence in Sub-Saharan Africa [42,43]. But the greatest innovation in HIV prevention came from the use of antiretrovirals prior to sex as a way to reduce the risk of HIV acquisition by those who are HIV-negative. This is known as pre-exposure prophylaxis (PrEP) and there is growing evidence that the use of Tenofovir/Emtricitabine is effective in reducing the

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incidence of HIV in populations at high risk of HIV when taken as PrEP [44]. In 2015, WHO recommended PrEP as an additional prevention option for HIV negative people at substantial risk of HIV [45]. Additionally, WHO consolidated guidelines on HIV self-testing and partner notification recommends the implementation of innovative approaches that include self-testing and testing provided by lay providers as part of overall HIV testing services [46].

The United Nations 2030 Agenda for Sustainable Development replaced the Millennium Development Goals, in 2015. The new 17 Sustainable Development Goals build on the achievements made previously. Target 3.3 sets an ambitious objective: “*By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases (...)*” [3]. The Political Declaration on HIV and AIDS from 2016, sets the commitment to accelerate the fight against HIV and to ending the AIDS epidemic by 2030 [47]. In 2015, UNAIDS had set ambitious targets for HIV treatment to measure country progress towards that goal: by 2020, 90% of all people living with HIV will know their HIV status; 90% of all people with diagnosed HIV infection will receive sustained antiretroviral therapy, and 90% of all people receiving antiretroviral therapy will have viral suppression [6].

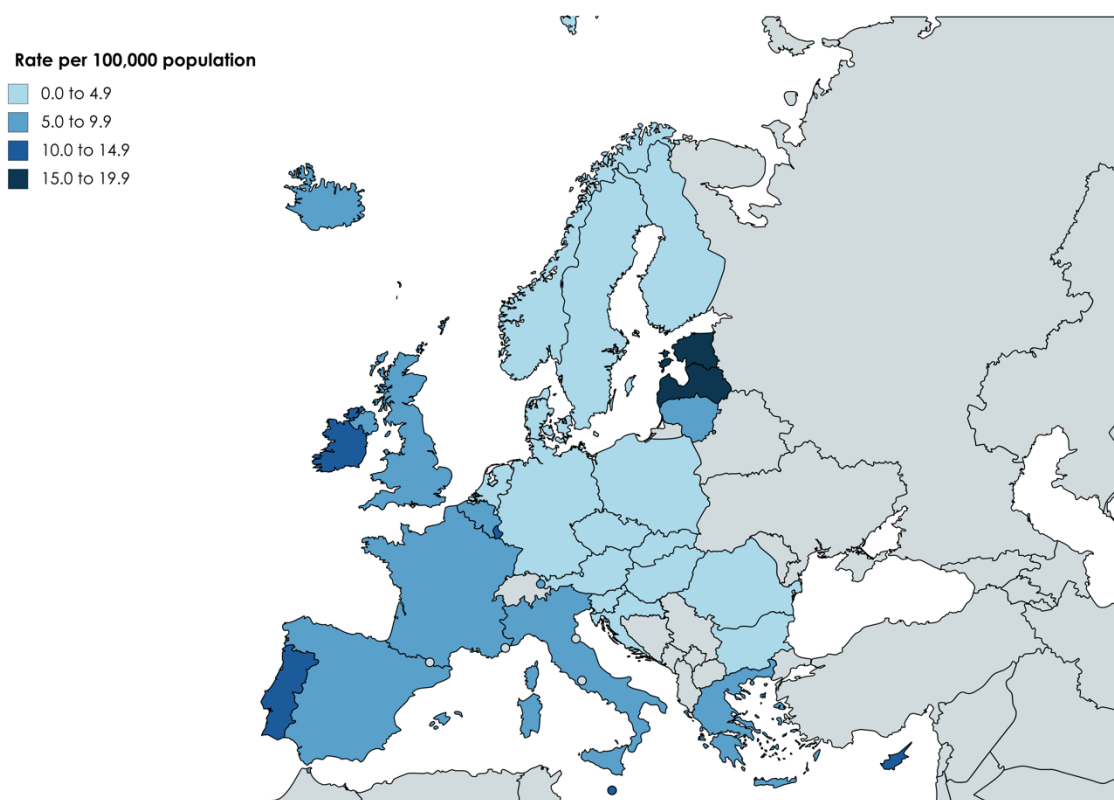
Launched in 2016, the WHO Global Health Sector Strategy on HIV for 2016-2021 describes the health sector contribution towards the achievement of those targets and provides guidance to countries on how to accelerate and focus HIV prevention, enable people to know their HIV status, and provide ART and comprehensive long-term care to all PLHIV [4].

The world has witnessed remarkable progress towards the reduction of HIV/AIDS burden, particularly in the past two decades, thanks to an unprecedented global commitment that brought public health officials, community leaders, and politicians together to combat AIDS [16]. Scientific progress in HIV treatment and innovation in HIV prevention strategies made it possible to mobilise efforts towards ending the AIDS epidemic by 2030. The global health agenda for HIV is currently focused on preventing new HIV infections, increasing the number of PLHIV who know their status, providing ART to all PLHIV and having them virally suppressed. Ending the AIDS epidemic by 2030 will require combined efforts, appropriate funding and the adoption of innovative strategies such as PrEP and HIV self-testing. More importantly, strong political will and

sound policy monitoring are necessary to reach the most affected population groups in the local epidemic context and therefore to achieve a sustainable reduction in HIV incidence and an improvement in treatment outcomes.

1.1.3. HIV/AIDS in Europe

Europe is experiencing a persistent HIV epidemic, with little changes in notifications during the past decade in the EU/EEA. In 2017, the highest rates of new HIV diagnoses were reported in Latvia (18.8 cases per 100,000 population) and Estonia (16.6); while the lowest rates were reported in Slovakia (1.3) and Slovenia (1.9) [2] (**Figure 1.1.1**).



Source: Author based on ECDC [2]

Figure 1.1.1. Rate of new HIV diagnoses (per 100,000 population), EU/EEA, 2017.

Sex between men is the main mode of HIV transmission reported in the EU/EEA in 2017, accounting for 38% of all new HIV diagnoses, while heterosexual contact was the second most common transmission mode among people newly diagnosed in 2017 (33%, equally divided between men and women); injecting drug use accounted for 4% of HIV diagnoses

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[2]. In 2017, 41% of those diagnosed in the EU/EEA were migrants, defined as those originating from outside of the country in which they were diagnosed, with 18% coming from countries in Sub-Saharan Africa, 8% from countries in Latin America and the Caribbean, 6% from other countries in central and eastern Europe, and 4% from other countries in western Europe [2].

Late diagnosis of HIV remains a problem in EU/EEA, with 49% of all cases with a CD4 count available being diagnosed with a CD4 count below 350 cells/mm³; 28% of cases were considered to have advanced HIV infection (CD4 count < 200 cells/mm³) [2].

Although epidemic patterns and trends vary widely across EU/EEA countries, trends by transmission mode show that the number of new HIV diagnoses among men who have sex with men (MSM) decreased slightly in 2017 when compared to recent years [2]. The same happened with the number of heterosexually transmitted cases, with sharper declines among women and foreign-born heterosexual people than among men and non-foreign-born people [2].

In 2004, representatives of States and Governments from Europe and Central Asia adopted the *Dublin Declaration*, emphasising HIV as an important political priority for countries in Europe and Central Asia [48]. The declaration establishes the commitment of these countries to act collectively in tackling the HIV/AIDS epidemic and sets out a number of actions to accelerate the achievement of this commitment. The countries agreed to closely monitor and evaluate the implementation of the actions outlined in the Declaration, along with those of the UN Declaration of Commitment on HIV/AIDS [48]. The European Centre for Disease Prevention and Control (ECDC) conducted regular monitoring of the Dublin Declaration, every two years. However, following the UNAIDS mandate to report annually on this progress, it was agreed that ECDC would monitor the HIV response of EU/EEA countries annually from 2019 onwards.

Building on the experience of the European Action plan for HIV/AIDS 2012–2015, the new Action Plan for the health sector response to HIV in the WHO European Region was launched in 2017 to guide Member States on the implementation of an essential package of HIV services that are people centred, accessible and appropriate to the national context, with a particular focus on key populations [5]. Based on global targets for HIV/AIDS, the Action Plan promotes a public health approach, with comprehensive HIV prevention and

access to HIV testing, and also a “*treat all*” approach by offering treatment to all PLHIV, including children, adolescents, adults, pregnant and breastfeeding women, and people with coinfections [5].

In 2016, most EU/EEA countries had a policy to provide treatment regardless of CD4 count, although this recommendation was implemented at a different pace across the countries [49]. However, the level of implementation of innovative interventions on testing (HIV self-testing) and prevention (PrEP) in EU/EEA is still weak. Given the HIV transmission patterns observed in those countries, the implementation of those interventions could have a crucial contribution to HIV response at the national level [2].

1.1.4. HIV response in Portugal

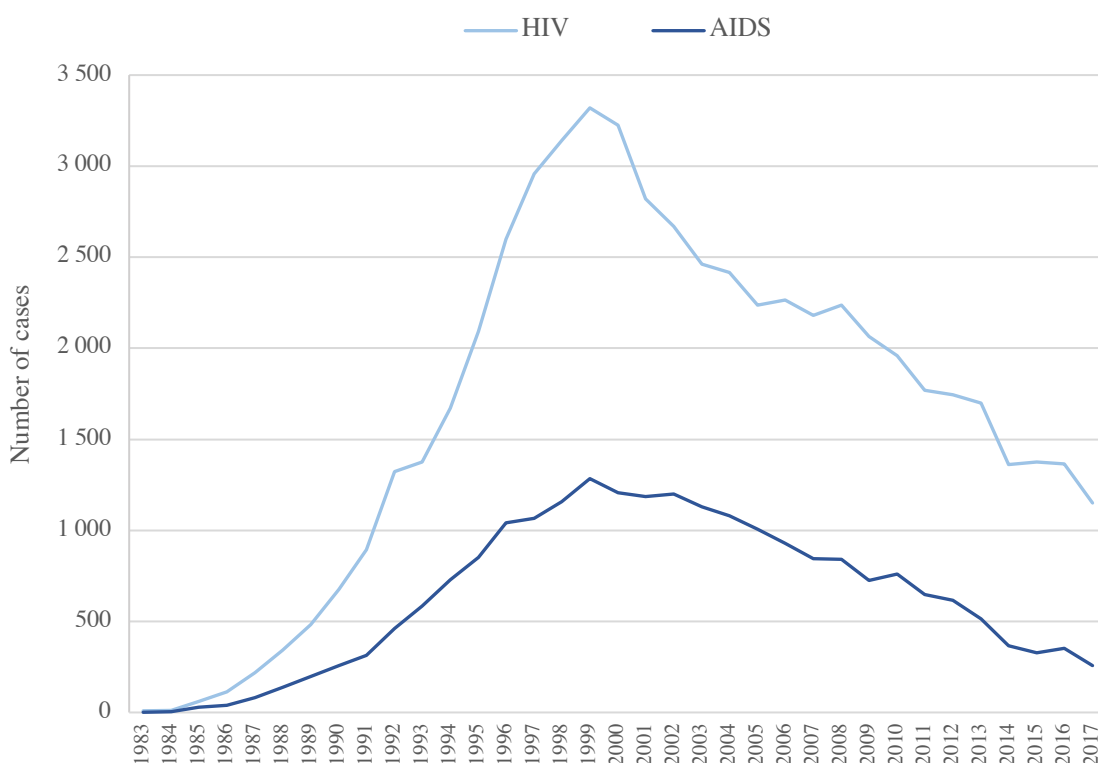
Since the first case of HIV infection was reported in 1983, Portugal had recorded a total number of 57,913 HIV cases by 2017 [50]. In 2017, Portugal recorded the fourth highest HIV incidence rate (10.3 new HIV diagnoses per 100,000 population) among EU/EEA countries, after Latvia (18.8), Estonia (16.6) and Malta (10.4) [2].

Portugal has a concentrated HIV epidemic. After reaching a peak in 1999, when the epidemic was mainly driven by cases among people who inject drugs (PWID), the number of both new HIV and AIDS diagnoses in Portugal has been decreasing steadily (**Figure 1.1.2**). Heterosexual contacts are the most frequent mode of HIV transmission identified among all cases diagnosed in recent years; however, sex between men recently exceeded heterosexual transmission amongst male cases [50]. As in other EU/EEA countries, late diagnosis is common as well as new HIV diagnoses among older age groups (50 years or older) [50].

The country’s national response to HIV started in 1985, when the first AIDS Working Group was established [51]; and in that same year, a national surveillance system of HIV infection was enacted, making it possible to compare the Portuguese HIV epidemic with other European countries. HIV/AIDS is a mandatory notifiable disease in Portugal since 2005 [52], and the national database of all HIV and AIDS cases reported in Portugal is maintained by the National Institute of Health (*Instituto Nacional de Saúde Doutor Ricardo Jorge*, INSA), which is the national reference laboratory of the Ministry of Health.

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ART has been fully covered by the universal National Health Service (NHS) and foreign citizens living in Portugal have legally the same access to NHS services, including ART, following the same conditions as national citizens. HIV drugs are generally provided at a hospital setting, although the provision at community pharmacies is currently being studied.



Source: INSA [50]

Figure 1.1.2. Number of new HIV and AIDS diagnoses, Portugal, 1983-2017.

The National Commission for the Fight Against AIDS (*Comissão Nacional de Luta Contra a SIDA*) was created in 1990 to replace the first AIDS Working Group. It became the official body responsible for coordinating Portugal's HIV response, focusing on prevention, education, research and surveillance [53].

Since the establishment of the National Commission for the Fight Against AIDS, the country has implemented several policies on HIV, approved new legislation, and developed and implemented new programmes. Enacted in 1993, the Syringe Exchange Programme has been the most important harm reduction policy implemented in Portugal aimed at controlling HIV infections among PWID [54]. In 2002, the network of

Voluntary Testing and Counselling Centres (*Centros de Aconselhamento e Detecção, CAD*) was launched, with the purpose of delivering services for voluntary, anonymous, confidential and free HIV testing, as well as pre- and post-counselling.

In 2005, the National Commission Against AIDS was replaced by the National Coordination for HIV/AIDS Infection, within the newly created High-Commissariat for Health [55,56]. This body was intended to provide technical support to policymaking and strategic planning, and its terms of reference also included the coordination of the four vertical programmes: Cardiovascular diseases, Oncologic diseases, Mental health, and HIV/AIDS [57]. The National Coordination for HIV/AIDS Infection was responsible for HIV/AIDS surveillance, leading an integrated information system created for that purpose, as well as acquiring and distributing prevention materials, including syringes, condoms and rapid tests.

Following the abolition of the High Commissariat for Health in 2011, the National Programme for HIV/AIDS Infection was created as part of a set of priority health programmes run by the Directorate-General of Health (*Direção-Geral da Saúde, DGS*) [58]. The National Programme for HIV/AIDS Infection coordinates national HIV response, maintaining the same attributions as its predecessor, and its strategic guidelines are aligned with the UNAIDS goals [59,60].

1.1.5. The Great Recession

Very few non-health events have had such a tremendous impact on the health of the populations as the so-called Great Recession; firstly, due to the global nature of the economic and financial crisis affecting many countries; and secondly, because of its consequences on social determinants of health.

The global crisis had multiple causes, and although this is not the scope of this work, it is important to provide a quick overview on what triggered such an overwhelming event. Authors agree that the expansionary monetary policy was the trigger for the asset price bubble of the housing price boom [61]. In fact, by lowering interest rates and inducing borrowing to acquire asset, monetary policy in the USA (but also in Europe) created the conditions to the eventual disruption of credit flows. While Americans were buying houses helped by mortgage lending, these loans were given to subprime borrowers. This was another cause of the financial crisis: the use of new financial instruments [62].

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Besides subprime loans, these innovative investment instruments included securitisation, derivatives and auction-rate securities, which were adopted before markets became aware of the flaws in these instruments, particularly the basic one: determining their price [61]. Both derivatives and mortgage-backed securities were difficult to price: a pool of mortgages was assumed to give the securities value, but as that pool was an assortment of mortgages of varying quality, it was hard to price the pool. Rating agencies also had no formula to determine the price of the security, and assigned ratings to complex securities, without examining the individual mortgages in the pool [61,62]. Those ratings tended to overstate the value of the securities and were pretty much arbitrary [61]. From the mortgage industry, the securitisation of mortgage loans quickly spread to commercial paper issuance, student loans, credit card receivables, and other loan categories, making the problems worse.

The origins of the global financial crisis can be traced back to 15 September 2008, when the collapse of Lehman Brothers, the fourth-largest investment bank in the United States (US), unfolded an unprecedented financial crisis that spread mainly through the USA and Europe [63]. In Europe, however, a number of countries had been sharing the same currency since 2002, limiting their capacity to withstand negative macroeconomic and financial shocks [7]. The European monetary union was never accompanied by a significant degree of banking or fiscal union, and this has been pointed as the major challenge of the Euro since the very beginning [64]. Euro countries have limits to their annual budget deficit (3% of GDP) and to their stock of public debt (60% of GDP), according to the Stability and Growth Pact designed in the beginning of this century, which also limits the ability of countries to deal with macroeconomic and financial shocks [7]. The design flaws of the Euro were to be exposed when the Great Recession came. As argued by some authors, Europe faced three different crises combined: a banking crisis in the Euro area, a growth crisis and a sovereign debt crisis [65]. Those three crises were closely interlinked. Firstly, because the banking system was insolvent, governments were called to support the banks in an attempt to contain the damages of a collapsing banking system. That worsened the countries' sovereign debts. Also, attempts at fiscal austerity to relieve the problems due to sovereign stress slowed economic growth (already hampered by a banking system in crisis) and economies faced stagnation or recession. In summary, macroeconomic imbalances in

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many Euro countries, coupled with a severe banking crisis, created a serious sovereign debt crisis that engulfed the Eurozone in 2010 [7].

As countries were struggling to repay or refinance their government debts, several austerity packages were implemented by governments pressured at EU level to control spending and raise revenue. The term *austerity* was widely used by media, politicians, academia and citizens to characterise the actions taken by governments during the Great Recession. The aim of economic austerity is to reduce a country's structural deficit [66]. Therefore, austerity measures include a combination of public expenditure reductions and increased taxes. The fundamental problem with this approach was the implementation of economic austerity at the bottom of the business cycle. After the turmoil generated by the 2008 financial crisis, global financial markets were demanding austerity in order to prevent defaults from governments [66]. However, one of the major consequences of economic austerity was the fact that it slowed growth and recovery.

The creation of the European Financial Stability Facility and the European Financial Stabilisation Mechanism in May 2010 (later replaced by the European Stability Mechanism in 2012) enabled financial assistance programmes for member states of the Eurozone struggling with financial difficulties.

Several countries in Southern Europe were particularly affected by the crisis. In May 2010, Greece received a bailout by the European Commission, European Central bank and International Monetary Fund (IMF): the Greek government and the three institutions agreed on a EUR 110 billion loan over a three-year period. Overall, Greece received a bailout of EUR 310 billion over three assistance programmes between May 2010 and August 2018 [67]. From 2011 until the end of 2013 the European Union and the IMF provided financial assistance to Ireland, including a joint financing package of EUR 85 billion (EUR 67.5 billion from external sources and EUR 17.5 billion from Irish funds) [68]. A few months later, in May 2011, Portugal requested financial assistance and a EUR 78 billion loan was part of an assistance programme that ended in May 2014 [69]. In July 2012, Spain also requested a bailout in order to recapitalise its financial institutions. The assistance programme lasted for 18 months and involved a bailout of EUR 41.3 billion [70]. Finally, after months of negotiation on the bailout terms, Cyprus received a EUR 10 billion loan in March 2013 [71]. The Cypriot programme lasted until March 2016. Other EU countries out of the Eurozone received bailouts as a result of the global economic

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crisis, including Hungary (October 2008, EUR 20 billion), Latvia (January 2009, EUR 2.9 billion), and Romania (June 2009, EUR 20 billion) [72].

The legacy of the crisis and economic austerity was overwhelming. Evidence suggests that the financial crisis has permanently lowered the path of GDP in all advanced economies and, simultaneously, fiscal consolidations implemented in many countries have had a negative impact on their growth rates [73]. Austerity also had severe consequences on jobs and income loss in the initial period. The turn to austerity hurt many countries' economies and hampered growth when the crisis was over [74].

1.1.6. Consequences on health status and health care systems

The consequences of the economic and financial crisis on the health of citizens and health care has been studied across Europe [75-77] and the subject has generated intense debate. However, findings of these research are very controversial. Following the onset of the crisis, a rise in suicides has been observed in Greece, Spain, the UK, and the USA [78-81]; and a rise in mental health disorders has been observed in Greece and Spain [82-84]. Literature also suggests that cases of infectious disease, homicides, substance abuse, and poor self-reported health have increased in Greece [78,85-87]. In contrast, evidence from studies that assessed the effects of economic cycles, showed that economic crisis reduce mortality related to road traffic accidents and cardiovascular events [88]. A recent literature review has concluded that the financial crisis in Europe seemed to have had heterogeneous effects on health outcomes, with the evidence being most consistent for suicides and mental health [89]. However, authors highlighted that most published studies on the impact of financial crisis on health in Europe had a substantial risk of bias [89].

The impact of the financial crisis on health care systems has also been the subject of research in recent years. The effects of the crisis on health care utilization are unclear, due to lack of measures to monitor the impact of the crisis and its consequences on health status and health care. From the demand side, income reductions could have had an impact in the use of health care services, as international evidence shows that low-income people have a higher use of in-patient care [90], and longer in-patient stays [91], due to deterioration of their health status. From the supply side, budget cuts could have led

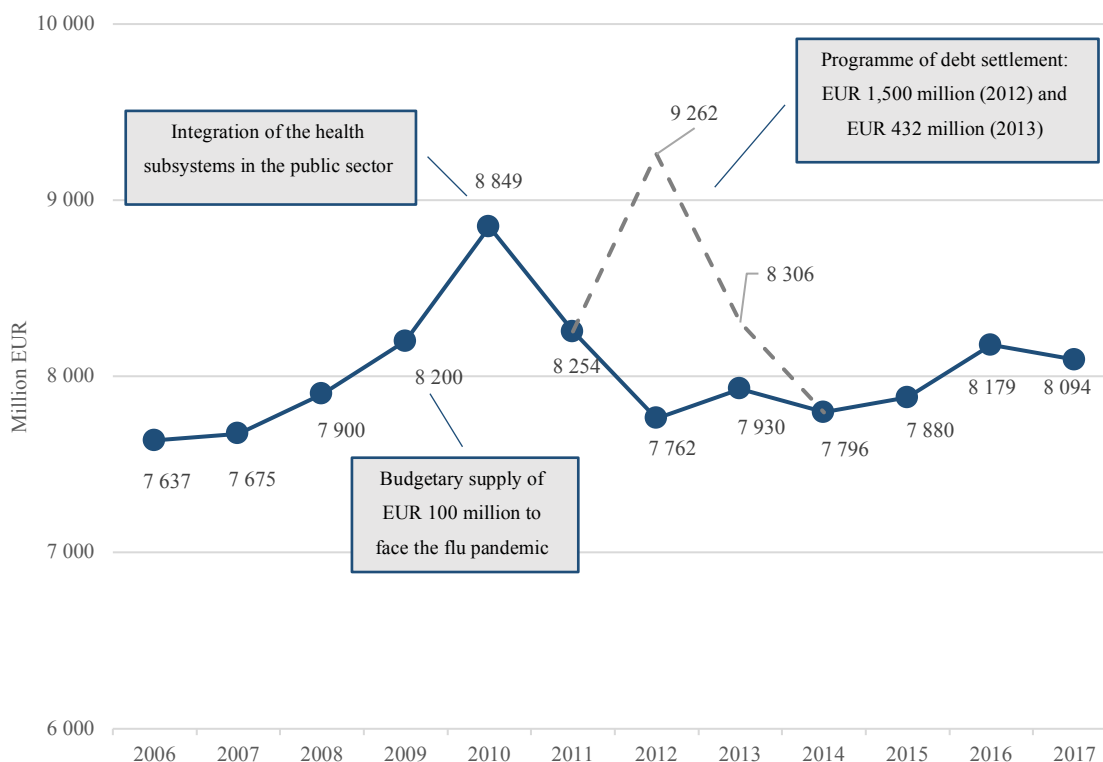
hospitals to reduce inefficiencies but also to decrease quality of health care provided, for instance by shortening the length of stay or reducing the number of admissions.

The available evidence for Portugal suggests a deterioration in access to health care since austerity measures were implemented in 2011, especially for vulnerable population groups not benefiting from exemptions in user charges [92]. The same applies to other countries in Southern Europe, particularly Greece and Spain [93,94], where austerity measures affected universal health coverage, population health and the welfare state [95]. The Portuguese health system is characterised by three co-existing systems: the universal National Health Service (NHS); the health subsystems, health insurance schemes for which membership is based on professional/occupational group or company; and private voluntary health insurance (VHI) [96]. It draws on a mix of public and private financing: the NHS is predominantly financed through general taxation; the health subsystems are financed mainly through employee and employer contributions and private VHI has a supplementary role. Given the importance of the public sector in the health system, the Memorandum of Understanding (MoU) signed in 2011 between the Portuguese government and the three international borrower institutions included a series of measures specifically targeting the health sector [97]. Overall, measures in the MoU aimed to cut costs and increase efficiency.

The specific measures included financing of the NHS and public sub-systems. From 2005 to 2010, the NHS budget increased steadily, both in absolute value and in proportion of GDP (**Figure 1.1.3**). However, during the financial assistance programme, the NHS budget decreased significantly: -12% between 2010 and 2014 (**Figure 1.1.3**). By 2011, public hospital's debt to suppliers reached EUR 3 billion [98]. This situation called for a special programme of debt settlement in 2012 and 2013, in a total amount of EUR 1.9 billion (**Figure 1.1.3**).

The increase of user charges in the NHS was probably the most debated measure. In 2010, user charges represented 0.74% of the NHS total revenue but in 2012 that figure raised to 1.70% [96]. However, exemption rules for user charges payment were also reviewed to include not only patients with chronic conditions (*e.g.* cancer, HIV, etc.) but also patients with low-income [99]. Although around 60% of the Portuguese population was exempted of paying user charges to use the NHS, those not included in an exemption category were paying much more to use publicly provided health care [96,99].

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Source: Ministry of Health

Figure 1.1.3. Budget execution in the Portuguese National Health Service (Million EUR), 2006-2017.

The pharmaceutical market reform, also inscribed in the MoU, had the objective of lowering government expenditure through a set of instruments: tougher pricing rules, promotion of generic drugs, reduction in the distribution margins and more rational prescription patterns by doctors [100]. However, the crucial measure that helped to contain costs in the Portuguese National Health Service was in fact applied to all public sector in Portugal: hiring of new personnel was limited, wages were frozen and additional wage cuts through taxation were imposed [96]. Additionally, in the health sector, the number of weekly working hours was increased from 35 to 40, without any effect in salaries. Between 2010 and 2015, the salary variation in the NHS was -9% and the variation of the number of professionals was -1% [101].

Other countries financially assisted by the EU felt the impact of the crisis and austerity measures on their health systems. In Greece, most of the measures introduced during the

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first wave of reforms (2010-14) were fiscal consolidation measures, resulting in increasing barriers in accessing health care and a deterioration of the population health [102]. In fact, between 2009 and 2016, 2.5 million Greeks (those who became unemployed for more than two years and their dependents, as well as the self-employed who could no longer afford to pay contributions) are estimated to have lost their health insurance coverage and, therefore, experienced barriers to access publicly provided services [102]. Like in Portugal, austerity measures imposed cuts in public expenditure with negative impacts on quality of health care provision, and human resources for health have been affected by salary cuts, hiring freezes and brain drain [102]. The health of the Greek population deteriorated as socioeconomic conditions got worse, with unemployment rate reaching 27.5% in 2013 [102]. The mental health of the population has deteriorated and suicide rates have increased during the crisis [103]. Furthermore, there was a substantial increase in HIV infections between 2009 (5.5 per 100,000 population) and 2012 (10.3 per 100,000 population) [104]. The increase in HIV incidence in Greece was mainly due to an HIV outbreak among injecting drug users, with the number of new HIV infections in this population increasing 15-fold from 2010 to 2011. This outbreak was linked to cuts in prevention programmes and deteriorating socioeconomic conditions [104-106].

In Cyprus, the financial crisis has also resulted in severe cuts in overall health expenditure [107]. The 2013 Economic Adjustment Programme for Cyprus formulated a number of recommendations regarding the health care sector aimed at increasing quality and efficiency of public health care provision in the country. These included changes to user charge policy and public sector eligibility with the objective of both raising revenues and reducing unnecessary demand for services [107]. Regarding HIV infection, there is evidence of increasing HIV incidence after 2014 [2]. Reports from 2014 mention the annual budget for medications, which is part of the government's budget as the country does not have a national health system, was cut from EUR 190 million to EUR 90 million [108].

In 2012, Spain requested financial assistance to the EU for the recapitalisation of financial institutions. Although targeting the banking system, the bailout was coupled with a series of austerity measures. Between 2009 and 2015, government expenditure on health decreased by 5.3% [109]. New legislation approved in 2012, re-defined who is entitled

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to health care, linking the entitlement to contributions to the system, and, thus, excluding young people over 26 who have never entered the job market and illegal immigrants from receiving health care [110]. Notwithstanding, the Spanish health system remains almost universal, covering 99.1% of the population [109]. During the crisis, HIV incidence in Spain declined from 11.2 new cases per 100 000 inhabitants in 2009 to 7.4 new cases per 100 000 inhabitants in 2015 [109].

Overall, the impact of the financial crisis and austerity measures on health systems in the countries that received financial assistance from the EU was different, according to the specific characteristics, strengths and fragilities in each health system. The same may apply to the impact on HIV policies in each country.

1.2. Study Aim and Objectives

The main aim of this study was to analyse the role played by the economic and financial assistance programme implemented in Portugal between 2011 and 2014 on the country's HIV response and national HIV policies.

To study the influence that financial constraints and cuts in health expenditure operated in this difficult period may have had on HIV epidemic, provision of preventive and treatment services and adoption of international recommendations is important not only to characterise Portugal's progress in eliminating AIDS by 2030, but also to draw policy implications to guide decision makers in the event of future economic downturns. The comparison with other countries that experienced EU assistance programmes is also important to place findings in an international perspective.

Specific objectives of this dissertation were:

1. To analyse the potential impact of the economic and financial adjustment programme on the length of stay of HIV/AIDS patients in public hospitals;
2. To analyse the outcomes of core HIV prevention programmes managed by the National Programme for HIV/AIDS Infection;
3. To analyse national HIV surveillance data, in order to better understand transmission patterns and identify red flags;
4. To examine and compare a set of HIV indicators and implementation of core HIV policies in Cyprus, Greece, Portugal and Spain.

1.3. Methods

This study used a quantitative methodology, using secondary national databases provided by different Ministry of Health institutions. The detailed methods used in each study are detailed ahead (see Section 2. Results).

The national data – either routine health information systems or national surveillance data – provide accurate opportunities for secondary data analysis [111]. These data have the potential to provide accurate, reliable, representative and continuous information on the health system and its patients [112-114]. Data collected as part of a public health surveillance system can be used to estimate the magnitude of a problem, identify groups at higher risk of having poorer outcomes, and examine relationships between risk factors and outcomes [115]. Furthermore, national surveillance data allow for tracking responses to policy changes in HIV testing, ART uptake, and progress in achieving the UNAIDS 90-90-90 targets for ending AIDS [116]. Summing up, the usage of national data is useful to inform programmes and policy making on HIV/AIDS.

For the purpose of this study, a set of dimensions of HIV policies were included in the analysis:

- *General health care* – Hospitalisations of HIV patients intended to capture the universal provision of healthcare within the Portuguese National Health Service;
- *HIV prevention and diagnosis* – Activities of the HIV/AIDS Programme include a set of prevention programmes including the syringe exchange programme, HIV rapid testing, preventive materials (male and female condoms, and lubricant), and also financial support to civil society organisations providing preventive services;
- *HIV surveillance* – Analysis of national surveillance provides information on major trends in Portugal, and allows the identification of key populations for whom prevention efforts can be strengthened;
- *HIV prevention, HIV diagnosis, HIV treatment and care* – Analysis of core indicators such as the adoption of Treat All recommendation, 90-90-90 targets, and implementation of pre-exposure prophylaxis and HIV self-testing is important to measure progress on ending AIDS by 2030.

Table 1.1.1. outlines the methods and data sources for each study.

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Table 1.1.1. Overview of Methods and data sources.

Study	Data source	Study design	Main outcome	Analysis
Impact of the economic and financial adjustment programme in HIV/AIDS length of stay: a longitudinal study for Portuguese hospitals, 2009-2014 (see Subsection 2.1)	Portuguese national database of the diagnosis related groups (AP-DRG v21.0) managed by the Central Administration of the Health System (body of the Portuguese Ministry of Health)	Observational ecological study with analytical time series	Length of stay of HIV/AIDS patients for the period 2009-2014	Hierarchical Poisson regression with random effects
Preventing HIV under financial constraints: the 2011-12 reform of the Portuguese HIV/AIDS Programme (see Subsection 2.2)	National Programme for HIV/AIDS Infection/ Directorate-General of Health (body of the Portuguese Ministry of Health)	Observational ecological study with descriptive time series	Programmatic and budgetary data on core HIV prevention programmes for the period 2009-2018.	Descriptive analysis
Trends in HIV surveillance data in Portugal, 2005-2017: patterns observed among native and foreign-born cases (see Subsection 2.3)	National Institute of Health Dr Ricardo Jorge (body of the Portuguese Ministry of Health)	Observational ecological study with descriptive time series	Number of new HIV and AIDS cases HIV by sex, route of transmission and place of birth for the period 2005-2017	Descriptive and time trend analysis with linear regression
HIV prevention and treatment in Southern Europe in the aftermath of bailout programmes (see Subsection 2.4)	ECDC, UNAIDS, WHO, national public health agencies	Observational ecological study with descriptive mixed design	Status on WHO's <i>Treat All</i> recommendation; Progress towards UNAIDS 90-90-90 targets; Status on policy implementation of PrEP and HIVST	Descriptive analysis

1.4. References

1. Joint United Nations Program on HIV/AIDS (UNAIDS). *Factsheet – Global AIDS Update* 2019.
https://www.unaids.org/sites/default/files/media_asset/UNAIDS_FactSheet_en.pdf. Accessed 12 September 2019.
2. European Centre for Disease Prevention and Control, WHO Regional Office for Europe. *HIV/AIDS surveillance in Europe 2018 – 2017 data*. Copenhagen: WHO Regional Office for Europe; 2018.
<https://ecdc.europa.eu/sites/portal/files/documents/hiv-aids-surveillance-europe-2018.pdf>. Accessed 12 September 2019.
3. United Nations. *Transforming our World: The 2030 Agenda for Sustainable Development*. 2015.
<https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>. Accessed 12 September 2019.
4. World Health Organization. *Global Health Sector Strategy on HIV, 2016-2021*. Geneva: WHO; 2016. <https://www.who.int/hiv/strategy2016-2021/ghss-hiv/en/>. Accessed 12 September 2019.
5. WHO Regional Office for Europe. *Action plan for the health sector response to HIV in the WHO European Region*. Copenhagen: WHO Europe; 2017.
http://www.euro.who.int/__data/assets/pdf_file/0007/357478/HIV-action-plan-en.pdf. Accessed 12 September 2019.
6. Joint United Nations Program on HIV/AIDS (UNAIDS). *UNAIDS Strategy 2016-2021*. Geneva: UNAIDS; 2015.
http://www.unaids.org/en/resources/documents/2015/UNAIDS_PCB37_15-18. Accessed 12 September 2019.
7. Lane PR. The European sovereign debt crisis. *Journal of Economic Perspectives*. 2012; 26 (3): 49-68. DOI: <http://doi.org/10.1257/jep.26.3.49>

1. GENERAL INTRODUCTION

8. European Commission. *EU financial assistance*. https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-financial-assistance_en. Accessed 12 September 2019.
9. Joint United Nations Program on HIV/AIDS (UNAIDS), The World Bank. *The Global Economic Crisis and HIV Prevention and Treatment Programmes: Vulnerabilities and Impact*. 2009.
http://data.unaids.org/pub/report/2009/jc1734_econ_crisis_hiv_response_en.pdf. Accessed 12 September 2019.
10. European Centre for Disease Prevention and Control (ECDC). *Health inequalities, the financial crisis, and infectious disease in Europe*. Stockholm: ECDC; 2013.
https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/Health_inequalities_financial_crisis.pdf. Accessed 12 September 2019.
11. Rechel B, Suhrcke M, Tsovala S, Suk JE, Desai M, McKee M, Stuckler D, Abubakar I, Hunter P, Senek M, Semenza JC. Economic crisis and communicable disease control in Europe: a scoping study among national experts. *Health Policy*. 2011; 103(2-3): 168-75. DOI: <http://doi.org/10.1016/j.healthpol.2011.06.013>
12. EMCDDA & ECDC. *Joint EMCDDA and ECDC rapid risk assessment HIV in injecting drug users in the EU/EEA, following a reported increase of cases in Greece and Romania*.
http://www.emcdda.europa.eu/system/files/publications/666/emcdda-ecdc-2012-riskassessment_321005.pdf. Accessed 12 September 2019.
13. European Centre for Disease Prevention and Control, WHO Regional Office for Europe. *HIV/AIDS surveillance in Europe 2012*. Stockholm: ECDC; 2013.
<https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/hiv-aids-surveillance-report-2012-20131127.pdf>. Accessed 12 September 2019.
14. European Centre for Disease Prevention and Control, WHO Regional Office for Europe. *HIV/AIDS surveillance in Europe 2018 – 2017 data*. Copenhagen: WHO Regional Office for Europe; 2018.

1. GENERAL INTRODUCTION

- <https://ecdc.europa.eu/sites/portal/files/documents/hiv-aids-surveillance-europe-2018.pdf>. Accessed 12 September 2019.
15. Shiffman J. HIV/AIDS and the rest of the global health agenda. *Bull World Health Organ*. 2006 Dec;84(12):923. DOI: <http://doi.org/10.2471/blt.06.036681>
 16. Piot P, Quinn TC. Response to the AIDS pandemic – a global health model [published correction appears in *N Engl J Med*. 2013 Sep 19;369(12):1180]. *N Engl J Med*. 2013;368(23):2210–2218. DOI: <http://doi.org/10.1056/NEJMra1201533>
 17. Joint United Nations Program on HIV/AIDS (UNAIDS). *Report on the global HIV/AIDS epidemic*. Geneva: UNAIDS; 2000. http://data.unaids.org/pub/report/2000/2000_gr_en.pdf. Accessed 12 September 2019.
 18. Piot P, Bartos M, Ghys PD, Walker N, Schwartlander B. The global impact of HIV/AIDS. *Nature*. 2001; 410:968-73. DOI: <http://doi.org/10.1038/35073639>
 19. United Nations General Assembly. *United Nations Millennium Declaration, Resolution Adopted by the General Assembly, 18 September 2000, A/RES/55/2*. <https://undocs.org/A/RES/55/2> Accessed 12 September 2019.
 20. United Nations (UN). *The Millennium Development Goals Report 2015*. New York: UN; 2015. [https://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20\(July%201\).pdf](https://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf) Accessed 12 September 2019.
 21. United Nations (UN). *Declaration of Commitment on HIV/AIDS. United Nations General Assembly Special Session on HIV/AIDS, 25-27 June 2001*. https://www.who.int/hiv/pub/advocacy/aidsdeclaration_en.pdf?ua=1. Accessed 12 September 2019.
 22. United Nations (UN). *Political Declaration on HIV and AIDS: Intensifying Our Efforts to Eliminate HIV and AIDS, Resolution Adopted by the General Assembly, 10 June 2011, A/RES/65/277*. https://www.unaids.org/sites/default/files/sub_landing/files/20110610_UN_A-RES-65-277_en.pdf Accessed 12 September 2019.

1. GENERAL INTRODUCTION

23. World Health Organization Maximizing Positive Synergies Collaborative Group. An assessment of interactions between global health initiatives and country health systems. *Lancet*. 2009;373(9681):2137-69. DOI: [http://doi.org/10.1016/S0140-6736\(09\)60919-3](http://doi.org/10.1016/S0140-6736(09)60919-3)
24. Biesma RG, Brugha R, Harmer A, Walsh A, Spicer N, Walt G. The effects of global health initiatives on country health systems: a review of the evidence from HIV/AIDS control. *Health Policy Plan*. 2009; 24(4): 239–252. DOI: <http://doi.org/10.1093/heapol/czp025>
25. Shiffman J. Has donor prioritization of HIV/AIDS displaced aid for other health issues? *Health Policy Pan*. 2008; 23(2): 95-100. DOI: <http://doi.org/10.1093/heapol/czm045>
26. El-Sadr WM, Abrams EJ. Scale-up of HIV care and treatment: can it transform healthcare services in resource-limited settings? *AIDS*. 2007; 21(Suppl 5):S65–70. DOI: <http://doi.org/10.1097/01.aids.0000298105.79484.62>
27. Rasschaert F, Pirard M, Philips MP, et al. Positive spill-over effects of ART scale up on wider health systems development: evidence from Ethiopia and Malawi. *J Int AIDS Soc*. 2011; 14(Suppl 1):S3. DOI: <http://doi.org/10.1186/1758-2652-14-S1-S3>
28. Harries AD, Zachariah R, Jahn A, Schouten EJ, Kamoto K. Scaling up antiretroviral therapy in Malawi-implications for managing other chronic diseases in resource-limited countries. *J Acquir Immune Defic Syndr*. 2009; 52(Suppl 1):S14–6. DOI: <http://doi.org/10.1097/QAI.0b013e3181bbc99e>
29. Joint United Nations Programme on HIV/AIDS (UNAIDS). *Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive*. Geneva: UNAIDS; 2011. https://www.unaids.org/sites/default/files/media_asset/20110609_JC2137_Global-Plan-Elimination-HIV-Children_en_1.pdf Accessed 12 September 2019.
30. Joint United Nations Programme on HIV/AIDS (UNAIDS). *The incredible journey of the Global Plan towards the elimination of new HIV infections among children*

by 2015 and keeping their mothers alive. Geneva: UNAIDS; 2016.
https://www.unaids.org/sites/default/files/media_asset/GlobalPlan2016_en.pdf

Accessed 12 September 2019.

31. Konopnicki D, Mocroft A, de Wit S, Antunes F, Ledergerber B, Katlama C, *et al.* Hepatitis B and HIV: prevalence, AIDS progression, response to highly active antiretroviral therapy and increased mortality in the EuroSIDA cohort. *AIDS*. 2005;19:593–601. DOI: <http://doi.org/10.1097/01.aids.0000163936.99401.fe>
32. Antiretroviral Therapy Cohort Collaboration. Life expectancy of individuals on combination antiretroviral therapy in high-income countries: a collaborative analysis of 14 cohort studies. *Lancet*. 2008; 372(9635):293–9. DOI: [http://doi.org/10.1016/S0140-6736\(08\)61113-7](http://doi.org/10.1016/S0140-6736(08)61113-7)
33. Mills EJ, Barnighausen T, Negin J. HIV and aging – preparing for the challenges ahead. *N Engl J Med*. 2012; 366(14): 1270–3. DOI: <http://doi.org/10.1056/NEJMp1113643>
34. Bendavid E, Holmes C, Bhattacharya J, Miller G. HIV development assistance and adult mortality in Africa. *JAMA*. 2012; 307:2060–7. DOI: <http://doi.org/10.1001/jama.2012.2001>
35. World Health Organization. *Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. Recommendations for a public health approach – Second edition*. Geneva: WHO; 2016.
<https://www.who.int/hiv/pub/arv/arv-2016/en/> Accessed 12 September 2019.
36. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, *et al.* Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med*. 2011;365(6):493-505. DOI: <http://doi.org/10.1056/NEJMoa1105243>
37. Quinn TC1, Wawer MJ, Sewankambo N, Serwadda D, Li C, Wabwire-Mangen F, Meehan MO, Lutalo T, Gray RH. Viral load and heterosexual transmission of human immunodeficiency virus type 1. Rakai Project Study Group. *N Engl J Med*. 2000 Mar 30;342(13):921-9. DOI: <http://doi.org/10.1056/NEJM200003303421303>

1. GENERAL INTRODUCTION

38. Committee on the Prevention and Control of Viral Hepatitis Infections. *Report brief: Reducing harm*. Washington, DC: Institute of Medicine of the National Academies; 2010.
<http://www.nationalacademies.org/hmd/~media/Files/Report%20Files/2010/Hepatitis-and-Liver-Cancer-A-National-Strategy-for-Prevention-and-Control-of-Hepatitis-B-and-C/Hepatitis%20and%20Liver%20Cancer%202010%20%20Report%20Brief.pdf>
Accessed 12 September 2019.
39. Gray RH, Li X, Kigozi G, Serwadda D, Nalugoda F, Watya S, Reynolds SJ, Wawer M. The impact of male circumcision on HIV incidence and cost per infection prevented: a stochastic simulation model from Rakai, Uganda. *AIDS*. 2007; 21:845–50. DOI: <http://doi.org/10.1097/QAD.0b013e3280187544>
40. Auvert B, Taljaard D, Lagarde E, Sobngwi-Tambekou J, Sitta R, Puren A. Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: the ANRS 1265 Trial. *PLoS medicine*. 2005; 2:e298. DOI: <http://doi.org/10.1371/journal.pmed.0020298>
41. Bailey RC, Moses S, Parker CB, Agot K, Maclean I, Krieger JN, *et al*. Male circumcision for HIV prevention in young men in Kisumu, Kenya: a randomised controlled trial. *Lancet*. 2007; 369:643–56. DOI: [http://doi.org/10.1016/S0140-6736\(07\)60312-2](http://doi.org/10.1016/S0140-6736(07)60312-2)
42. Gray R, Kigozi G, Kong X, Ssempiija V, Makumbi F, Watty S, Serwadda D, Nalugoda F, Sewenkambo NK, Wawer MJ. The effectiveness of male circumcision for HIV prevention and effects on risk behaviors in a posttrial follow-up study. *AIDS*. 2012; 26:609–15. DOI: <http://doi.org/10.1097/QAD.0b013e3283504a3f>
43. Tobian AA, Serwadda D, Quinn TC, Kigozi G, Gravitt PE, Laeyendecker O, *et al*. Male circumcision for the prevention of HSV-2 and HPV infections and syphilis. *N Engl J Med*. 2009; 360:1298–309. DOI: <http://doi.org/10.1056/NEJMoa0802556>
44. Reyniers T, Hoornenborg E, Vuylsteke B, Wouters K, Laga M. Pre-exposure prophylaxis (PrEP) for men who have sex with men in Europe: review of evidence

1. GENERAL INTRODUCTION

- for a much needed prevention tool. *Sex Transm Infect.* 2017; 93(5):363-367. DOI: <http://doi.org/10.1136/sextrans-2016-052699>
45. World Health Organization. *Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV.* Geneva: WHO; 2015. <https://www.who.int/hiv/pub/guidelines/earlyrelease-arv/en/> Accessed 12 September 2019.
46. World Health Organization. *Guidelines on HIV self-testing and partner notification. Supplement to consolidated guidelines on HIV testing services.* Geneva: WHO; 2016. <https://www.who.int/hiv/pub/self-testing/hiv-self-testing-guidelines/en/> Accessed 12 September 2019.
47. United Nations (UN). *Political Declaration on HIV and AIDS: On the Fast Track to Accelerating the Fight against HIV and to Ending the AIDS Epidemic by 2030, Resolution adopted by the General Assembly on 8 June 2016, A/RES/70/266.* https://www.unaids.org/sites/default/files/media_asset/2016-political-declaration-HIV-AIDS_en.pdf Accessed 12 September 2019.
48. Ireland 2004 – Presidency of the European Union. *Dublin Declaration on Partnership to fight HIV/AIDS in Europe and Central Asia;* 2004. <https://www.osce.org/secretariat/29873?download=true> Accessed 12 September 2019.
49. European Centre for Disease Prevention and Control. *The status of the HIV response in the European Union/European Economic Area, 2016.* Stockholm: ECDC; 2017. <https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/Status-of-HIV-response-in-EU-EEA-2016-30-jan-2017.pdf> Accessed 12 September 2019.
50. National Institute of Health Dr Ricardo Jorge (INSA). *Infeção VIH e SIDA: a situação em Portugal a 31 de dezembro de 2017 [HIV Infection and AIDS: situation in Portugal on 31 December 2017].* Lisbon: INSA; 2018. http://repositorio.insa.pt/bitstream/10400.18/5666/5/INSA_Relatorio_VIH_e_SID_A_2017.pdf Accessed 12 September 2019.

1. GENERAL INTRODUCTION

51. Aviso [Notice], Secretary-General of the Ministry of Health. *Diário da República [Government Gazette]* No. 241, Serie II. 19 October 1985.
52. Portaria No. 258/2005 [Ordinance No. 258/2005], of 16 March 2005. *Diário da República [Government Gazette]* No. 53, Série I-B. 16 March 2005. <https://dre.pt/application/conteudo/572670>. Accessed 12 September 2019.
53. Despacho No. 5/90 [Dispatch No. 5/90], Ministry of Health, of 3 April 1990. *Diário da República [Government Gazette]* No. 78, Serie II. 3 April 1990.
54. Torre C, Lucas R, Barros H. Syringe exchange in community pharmacies – The Portuguese experience. *Int J Drug Policy*. 2010; 21(6): 514-7. DOI: <http://doi.org/10.1016/j.drugpo.2010.09.001>
55. Decreto-Regulamentar No. 7/2005 [Regulatory-Decree No. 7/2005], of 10 August 2005. *Diário da República [Government Gazette]* No. 153, Serie I-B. 10 August 2005. <https://dre.pt/application/conteudo/241792>. Accessed 12 September 2019.
56. Despacho No. 19871/2005 [Dispatch No. 19871/2005], Minister of Health, of 15 September 2005. *Diário da República [Government Gazette]* No. 158, Serie II. 15 September 2005. <https://dre.pt/application/conteudo/2577223>. Accessed 12 September 2019.
57. Decreto-Lei No. 218/2007 [Decree-Law No. 218/2007], of 29 May 2007. *Diário da República [Government Gazette]* No. 103, Serie I. 29 May 2007. <https://dre.pt/application/conteudo/638528>. Accessed 12 September 2019.
58. Despacho No. 404/2012 [Dispatch no. 404/2012], of 13 January 2012. *Diário da República [Government Gazette]* No. 10, Serie II. 13 January 2012. <https://dre.pt/application/conteudo/2150516>. Accessed 12 September 2019.
59. Directorate-General of Health/National Programme for HIV/AIDS Infection. *National Programme for Prevention and Control of HIV/AIDS Infection*. <http://www.pnvihsida.dgs.pt/programa-nacional1111111111.aspx>. Accessed 12 September 2019.

60. Directorate-General of Health/National Programme for HIV/AIDS Infection. *Infeção VIH e SIDA – Desafios e Estratégias 2018 [HIV Infection and AIDS – Challenges and Strategies 2018]*. Lisbon: DGS; 2018. <https://www.dgs.pt/documentos-e-publicacoes/infecao-vih-e-sida-desafios-e-estrategias-2018.aspx>. Accessed 12 September 2019.
61. Schwatz AJ. Origins of the Financial Market Crisis of 2008. *Cato Journal*. 2009;29(1):19-23. <https://www.cato.org/sites/cato.org/files/serials/files/cato-journal/2009/1/cj29n1-2.pdf>. Accessed 13 September 2019.
62. Arestis P, Sobreira R, Oreiro JL (Eds.). *The Financial Crisis: Origins and Implications*. Palgrave Macmillan; 2011. DOI: <http://doi.org/10.1057/9780230303942>
63. The Economist. *The origins of the financial crisis – Crash course*. 7 September 2013. <https://www.economist.com/schools-brief/2013/09/07/crash-course>. Accessed 13 September 2019.
64. Lane PR. The Real Effects of European Monetary Union. *Journal of Economic Perspectives*. 2006; 20(4): 47–66. DOI: <http://doi.org/10.1257/jep.20.4.47>
65. Shambaugh, JC. The Euro’s Three Crises. *Brookings Papers on Economic Activity*. 2012 (1): 157-231. DOI: <http://doi.org/10.1353/eca.2012.0006>
66. Konzelmann S. *The Economics of Austerity*. Cheltenham: Edward Elgar Publishing; 2014.
67. European Commission. *Financial assistance to Greece*. https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-financial-assistance/which-eu-countries-have-received-assistance/financial-assistance-greece_en Accessed 13 September 2019.
68. European Commission. *Financial assistance to Ireland*. https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-financial-assistance/which-eu-countries-have-received-assistance/financial-assistance-ireland_en Accessed 13 September 2019.

1. GENERAL INTRODUCTION

69. European Commission. *Financial assistance to Portugal*. https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-financial-assistance/which-eu-countries-have-received-assistance/financial-assistance-portugal_en Accessed 13 September 2019.
70. European Commission. *Financial assistance to Spain*. https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-financial-assistance/which-eu-countries-have-received-assistance/financial-assistance-spain_en Accessed 13 September 2019.
71. European Commission. *Financial assistance to Cyprus*. https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-financial-assistance/which-eu-countries-have-received-assistance/financial-assistance-cyprus_en Accessed 13 September 2019.
72. European Commission. *EU financial assistance*. https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-financial-assistance_en Accessed 13 September 2019.
73. Fatás A & Summers LH. The permanent effects of fiscal consolidations. *Journal of International Economics*. 2018; 112: 238-250. DOI: <https://doi.org/10.1016/j.jinteco.2017.11.007>
74. Krugman P. Austerity's Grim Legacy. *The New York Times*. 6 November 2015. <https://www.nytimes.com/2015/11/06/opinion/austeritys-grim-legacy.html> Accessed 13 September 2019.
75. Karanikolos M, Kentikelenis A. Health inequalities after austerity in Greece. *Int J Equity Health*. 2016;15:83. DOI: <http://doi.org/10.1186/s12939-016-0374-0>
76. Karanikolos M, Mladovsky P, Cylus J, Thomson S, Basu S, Stuckler D, Mackenbach JP, McKee M. Financial crisis, austerity, and health in Europe. *Lancet*. 2013;381(9874):1323–1331. DOI: [http://doi.org/10.1016/S0140-6736\(13\)60102-6](http://doi.org/10.1016/S0140-6736(13)60102-6)

77. García-Gómez P, Jiménez-Martín S, Labeaga JM. Consequences of the economic crisis on health and health care systems. *Health Econ.* 2016;25(Suppl 2):3-5. DOI: <http://doi.org/10.1002/hec.3442>
78. Kondilis E, Giannakopoulos S, Gavana M, Ierodiakonou I, WaitzkinH, Benos A. Economic crisis, restrictive policies, and the population's health and health care: the Greek case. *Am J Public Health.* 2013; 103(6): 973–9. DOI: <http://doi.org/10.2105/AJPH.2012.301126>
79. Bernal JAL, Gasparrini A, Artundo CM, McKee M. The effect of the late2000 financial crisis on suicides in Spain: an interrupted time-series analysis. *Eur J Public Health.* 2013;23(5):732–6. DOI: <http://doi.org/10.1093/eurpub/ckt083>
80. Barr B, Taylor-Robinson D, Scott-Samuel A, McKee M, Stuckler D. Suicides associated with the 2008-10 economic recession in England: time trend analysis. *BMJ.* 2012;345. DOI: <http://doi.org/10.1136/bmj.e5142>
81. Reeves A, Stuckler D, McKee M, Gunnell D, Chang S-S, Basu S. Increase in state suicide rates in the USA during economic recession. *Lancet.* 2012; 380(9856): 1813-4. DOI: [http://doi.org/10.1016/S0140-6736\(12\)61910-2](http://doi.org/10.1016/S0140-6736(12)61910-2)
82. Economou M, Madianos M, Peppou LE, Patelakis A, Stefanis CN. Major depression in the era of economic crisis: a replication of a cross-sectional study across Greece. *J Affect Disord.* 2012; 145(3): 308–314. DOI: <http://doi.org/10.1016/j.jad.2012.08.008>
83. Economou M, Madianos M, Peppou LE, Theleritis C, Patelakis A, Stefanis C. Suicidal ideation and reported suicide attempts in Greece during the economic crisis. *World Psychiatry.* 2013; 12(1): 53–59. DOI: <http://doi.org/10.1002/wps.20016>
84. Gili M, Roca M, Basu S, McKee M, Stuckler D. The mental health risks of economic crisis in Spain: evidence from primary care centres, 2006 and 2010. *Eur J Pub Health.* 2013;23(1):103–108. DOI: <http://doi.org/10.1093/eurpub/cks035>

1. GENERAL INTRODUCTION

85. Kentikelenis A, Karanikolos M, Papanicolas I, Basu S, McKee M, Stuckler D. Health effects of financial crisis: omens of a Greek tragedy. *Lancet*. 2011; 378(9801): 1457–1458. DOI: [http://doi.org/10.1016/S0140-6736\(11\)61556-0](http://doi.org/10.1016/S0140-6736(11)61556-0)
86. Zavras D, Tsiantou V, Pavi E, Mylona K, Kyriopoulos J. Impact of economic crisis and other demographic and socio-economic factors on self-rated health in Greece. *Eur J Pub Health*. 2013;23(2):206–210. DOI: <http://doi.org/10.1093/eurpub/cks143>
87. VANDOROS S, HESSEL P, LEONE T, AVENDANO M. Have health trends worsened in Greece as a result of the financial crisis? A quasi-experimental approach. *Eur J Pub Health*. 2013;23(5):727–731. DOI: <http://doi.org/10.1093/eurpub/ckt020>
88. Ruhm CJ. Understanding the relationship between macroeconomic conditions and health. In: *The Elgar companion to health economics*. Northampton: Edward Elgar Publishing; 2011.
89. Parmar D, Stavropoulou C, Ioannidis JP. Health outcomes during the 2008 financial crisis in Europe: systematic literature review. *BMJ*. 2016; 354: i4588. DOI: <http://doi.org/10.1136/bmj.i4588>
90. Van Doorslaer E, Wagstaff A, Van der Burg H, Christiansen T, DeGraeve D, Duchesne I, *et al*. Equity in the delivery of health care in Europe and the US. *J Health Econ*. 2000; 19(5): 553–583. DOI: [https://doi.org/10.1016/S0167-6296\(00\)00050-3](https://doi.org/10.1016/S0167-6296(00)00050-3)
91. Perelman J, Closon M-C. Impact of socioeconomic factors on in-patient length of stay and their consequences in per case hospital payment systems. *J Health Serv Res Policy*. 2011;16(4):197–202. DOI: <http://doi.org/10.1258/jhsrp.2011.010047>
92. Legido-Quigley H, Karanikolos M, Hernandez-Plaza S, de Freitas C, Bernardo L, Padilla B, *et al*. Effects of the financial crisis and troika austerity measures on health and health care access in Portugal. *Health Policy*. 2016;120(7):833–839. DOI: <http://doi.org/10.1016/j.healthpol.2016.04.009>

93. Kentikelenis A, Karanikolos M, Reeves A, McKee M, Stuckler D. Greece's health crisis: from austerity to denialism. *Lancet*. 2014;383(9918):748–753. DOI: [http://doi.org/10.1016/S0140-6736\(13\)62291-6](http://doi.org/10.1016/S0140-6736(13)62291-6)
94. Legido-Quigley H, Montgomery CM, Khan P, Atun R, Fakoya A, Getahun H, Grant AD. Integrating tuberculosis and HIV services in low- and middle-income countries: a systematic review. *Tropical Med Int Health*. 2013;18(2):199–211. DOI: <http://doi.org/10.1111/tmi.12029>
95. Kentikelenis A. Bailouts, austerity and the erosion of health coverage in southern Europe and Ireland. *Eur J Pub Health*. 2015; 25(3): 365–366. DOI: <http://doi.org/10.1093/eurpub/ckv055>
96. Simões J, Augusto GF, Fronteira I, Hernandez-Quevedo C. Portugal: Health System Review. *Health Syst Transit*. 2017; 19(2): 1-184. http://www.euro.who.int/_data/assets/pdf_file/0007/337471/HiT-Portugal.pdf?ua=1. Accessed 13 September 2019.
97. Portugal – Memorandum of understanding on specific economic policy conditionality, 17 May 2011. http://ec.europa.eu/economy_finance/eu_borrower/mou/2011-05-18-mou-portugal_en.pdf. Accessed 13 September 2019.
98. Augusto GF. Cuts in Portugal's NHS could compromise care. *Lancet*. 2012; 379(9814):400. DOI: [http://doi.org/10.1016/s0140-6736\(12\)60174-3](http://doi.org/10.1016/s0140-6736(12)60174-3)
99. Barros PP. Health policy reform in tough times: the case of Portugal. *Health Policy*. 2012;106(1):17–22. DOI: <http://doi.org/10.1016/j.healthpol.2012.04.008>
100. Barros PP. Pharmaceutical market reforms in Portugal under the Memorandum of Understanding. *Eurohealth*. 2012; 18(1): 33-36. http://www.euro.who.int/_data/assets/pdf_file/0005/162959/Eurohealth_Vol-18_No-1_web.pdf Accessed 13 September 2019.
101. Observatório Português dos Sistemas de Saúde. *Meio caminho andado: relatório Primavera 2018*. Lisbon; 2018. <http://opss.pt/wp->

1. GENERAL INTRODUCTION

- [content/uploads/2018/06/relatorio-primavera-2018.pdf](#) Accessed 13 September 2019.
[2019](#) Accessed 13 September 2019.
102. Economou C, Kaitelidou D, Karanikolos M, Maresso A. Greece: Health System Review. *Health Syst Transit*. 2017; 19(5): 1-166. http://www.euro.who.int/_data/assets/pdf_file/0006/373695/hit-greece-eng.pdf?ua=1 Accessed 13 September 2019.
103. Drydakakis N. The effect of unemployment on self-reported health and mental health in Greece from 2008 to 2013: a longitudinal study before and during the financial crisis. *Soc Sci Med*. 2015; 128:43–51. DOI: <http://doi.org/10.1016/j.socscimed.2014.12.025>
104. European Centre for Disease Prevention and Control. *Detecting and responding to outbreaks of HIV among people who inject drugs: best practices in HIV prevention and control – Meeting Report*. Stockholm: ECDC; 2012. <https://www.ecdc.europa.eu/sites/default/files/media/en/publications/Publications/MER-IDU-outbreaks.pdf> Accessed 13 September 2019.
105. Bonovas S, Nikolopoulos G. High-burden epidemics in Greece in the era of economic crisis. Early signs of a public health tragedy. *J Prev Med Hyg*. 2012;53(3):169-71. <https://www.jpmh.org/index.php/jpmh/article/view/340/318> Accessed 13 September 2019.
106. Economou C, Kaitelidou D, Kentikelenis A, Sissouras A, Maresso A. *The impact of the financial crisis on the health system and health in Greece*. Copenhagen: European Observatory on Health Systems and Policies; 2014. http://www.euro.who.int/_data/assets/pdf_file/0007/266380/The-impact-of-the-financial-crisis-on-the-health-system-and-health-in-Greece.pdf Accessed 13 September 2019.
107. Organisation for Economic Co-operation and Development/European Observatory on Health Systems and Policies. *Cyprus: Country Health Profile 2017, State of Health in the EU*. Paris: OECD Publishing; Brussels: European Observatory on

- Health Systems and Policies. <http://dx.doi.org/10.1787/9789264283329-en>
Accessed 13 September 2019.
108. European Centre for Disease Prevention and Control. *Technical mission: HIV in Cyprus, 15–17 October 2014*. Stockholm: ECDC; 2015. <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/hiv-cyprus-2014.pdf> Accessed 13 September 2019.
109. Bernal-Delgado E, Garcia-Armesto S, Oliva J, Sanchez Martinez FI, Repullo JR, Pena-Longobardo LM, Ridao-Lopez M, Hernandez-Quevedo C. Spain: Health System Review. *Health Syst Transit*. 2018 May;20(2):1-179. http://www.euro.who.int/_data/assets/pdf_file/0008/378620/hit-spain-eng.pdf?ua=1 Accessed 13 September 2019.
110. Gallo P, Gené-Badia J. Cuts drive health system reforms in Spain. *Health Policy*. 2013;113(1-2):1-7. DOI: <http://doi.org/10.1016/j.healthpol.2013.06.016>
111. Gloyd S, Wagenaar BH, Woelk GB, Kalibala S. Opportunities and challenges in conducting secondary analysis of HIV programmes using data from routine health information systems and personal health information. *J Int AIDS Soc*. 2016;19(5 Suppl 4):20847. DOI: <http://doi.org/10.7448/IAS.19.5.20847>
112. Wagenaar BH, Kenneth Sherr K, Fernandes Q, Wagenaar AC. Using routine health information systems for well-designed health evaluations in low and middle-income countries. Methodological musings. *Health Policy Plann*. 2015;1:17. DOI: <http://dx.doi.org/10.1093/heapol/czv029>
113. Mutale W, Chintu N, Amoroso C, Awoonor-Williams K, Phillips J, Baynes C, *et al*. Improving health information systems for decision making across five sub-Saharan African countries: implementation strategies from the African Health Initiative. *BMC Health Serv Res*. 2013;13(Suppl 2):S9. DOI: <http://doi.org/10.1186/1472-6963-13-S2-S9>
114. AbouZahr C, Boerma T. Health information systems: the foundations of public health. *Bull World Health Organ*. 2005;83(8):578-83. <https://apps.who.int/iris/handle/10665/73153> Accessed 13 September 2019.

1. GENERAL INTRODUCTION

115. Soucie JM. Public health surveillance and data collection: general principles and impact on hemophilia care. *Hematology*. 2012;17 Suppl 1(01):S144–S146. DOI: <http://doi.org/10.1179/102453312X13336169156537>
116. Sohn AH, Judd A, Mofenson L, Vicari M, Jerene D, Leroy V, Bekker LG, Davies MA. Using Observational Data to Inform HIV Policy Change for Children and Youth. *J Acquir Immune Defic Syndr*. 2018;78 (Suppl 1):S22–S26. DOI: <http://doi.org/10.1097/QAI.0000000000001745>

2. RESULTS

2.1. Impact of the economic and financial adjustment programme in HIV/AIDS length of stay: a longitudinal study for Portuguese hospitals, 2009-2014

2.1.1. Introduction

The economic and financial crisis that started in 2008 reached Portugal in 2009 and had economic and social consequences that are still felt to this day. Portugal has experienced recessions in 2009 (-2.98% in GDP), 2011 (-1.83%), 2012 (-4.03%) and 2013 (-1.13%) and this was accompanied by a dramatic rise in the unemployment rate, which rose from 7.6% in 2008 to 16.2% in 2013 [1]. Due to the high level of public debt and the increasing difficulty in financing its economy, the country received a financial bailout by the European Commission, the International Monetary Fund and the European Central Bank [2].

In the Memorandum of Understanding (MoU) signed with the three institutions above, the Portuguese government compromised by implementing a number of reforms aimed at reducing public spending. With regard to the health sector, the MoU set a number of measures aimed at cost containment and increasing efficiency within the Portuguese National Health Service (NHS) [3]. These included severe cuts in the wages of health care worker; the creation and implementation of clinical guidelines; the reorganisation and rationalisation of the hospital network through specialisation and concentration of hospital and emergency services; and setting up a system for comparing hospital performance (benchmarking) [4].

The consequences of the economic and financial crisis on the health of the citizens and health care has been studied all over Europe [5-7] and has generated intense debate. However, the impact of these events on health care use is still unclear, mainly due to lack of measures to monitor the impact of the crisis and its consequences on health and health care. From the demand side, one could argue that income reductions could have an impact in the use of health care services, as international evidence shows that low-income people have a higher use of in-patient care [8], and longer in-patient stays [9], due to deterioration of their health status. From the supply side, budget cuts could have led hospitals to reduce

2. RESULTS

inefficiencies but also to decrease quality of health care provided (*e.g.* by reducing length of stay or decreasing the number of admissions).

The impact of the crisis on the health of the population has been the focus of recent research but findings are very controversial. Following the onset of the crisis, a rise in suicides has been observed in Greece, Spain, the UK, and the USA [10-13]; and a rise in mental health disorders has been observed in Greece and Spain [14-16]. Literature also suggests that there has been an increase in cases of infectious disease, homicides, substance abuse, and poor self-reported health in Greece [10,17-19]. In contrast, there is evidence showing that economic crisis is associated with reduced mortality related to road traffic accidents and cardiovascular events [20].

The existing evidence suggests that since austerity measures came into effect in 2011 there has been a decline in access to health care in Portugal, particularly among vulnerable population groups who do not benefit from user charges exemptions [21]. Other Southern European countries, namely Greece and Spain [22,23], experienced a similar situation and witnessed a serious setback in terms of the universal health coverage, population well-being and welfare state as a result of austerity measures [24].

The crisis led many countries to reduce budgets earmarked for control and prevention of infectious diseases, including HIV [25,26]. People living with HIV (PLHIV) are vulnerable group who need constant hospital care both outpatient and inpatient) and, therefore, constitute a relevant case study to evaluate how the austerity measures imposed by the MoU had an impact in health care provision. As PLHIV are living longer and experiencing age-associated comorbidities, hospitalizations have become an important indicator of healthcare expenditure in these patients. As in the rest of the world, in Portugal HIV-related hospitalizations are among the most expensive. In 2008, the average cost of treatment was 14,277 EUR/patient/year, with the main cost-driver being ART (EUR 9,598), followed by hospitalization costs (EUR 1,323) [27]. In addition, the weight of hospitalization costs was considerably higher for the most severely affected patients [27].

By identifying and characterising the variations in length of stay (LOS) among HIV/AIDS hospitalizations across different Portuguese hospitals, the aim of this paper was to analyse the potential impact of the economic and financial adjustment programme (EFAP) on HIV/AIDS patients LOS.

2.1.2. Methods

2.1.2.1. Data source

Data used in this analysis were collected from the Portuguese national database of the diagnosis related groups (AP-DRG v21.0) managed by the Central Administration of the Health System (ACSS). The DRG database is anonymous and available for scientific research. DRGs were first introduced in Portuguese hospitals through a pilot study in 1984 and, since the 1990s, DRGs are used for DRG-based hospital budget allocation from the NHS to hospitals and for DRG-based case payment from third-party payers [28].

Currently, there is only one DRG system in Portugal that applies to all NHS hospitals (public) and all patients (inpatients and ambulatory surgery), with exception of outpatients and patients treated in psychiatric and rehabilitation healthcare settings. Private hospitals are not included in the system. The DRG system currently in place defines 669 DRGs within 25 Major Diagnostic Categories (MDCs), each corresponding to one organ or physiological system [28]. The DRG system is supervised and maintained by the ACSS within the Ministry of Health.

In the DRG database, each record corresponds to a discharge episode (hospitalization) and includes information about the patient as well as information collected during the hospitalization, including age, sex, place of residence, type of admission (elective or urgent), dates of hospitalization and discharge, principal diagnosis and secondary diagnosis, procedures during hospitalization, and outcome at discharge (dead or alive).

2.1.2.2. Study population

We considered only discharges classified under MDC created for patients with HIV infection (MDC 24). Thus, the dataset provided by the ACSS included 20,580 discharges registered in public acute care hospitals in the Portuguese NHS classified under MDC 24, between 1st January 2009 and 31st December 2014. For this study we considered only those that met the following criteria: inpatients aged 18 or older; hospitalizations from hospitals with more than 10 discharges. Following these criteria, 20,361 hospitalizations occurring in 41 hospitals were included in the analysis (**Figure 2.1.1**).

Unlike previous studies [29,30], transfers were not excluded from the analysis in order to capture the dynamics of the referral system among NHS hospitals. Thus, shorter

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hospitalizations in smaller hospitals followed by longer hospitalizations in bigger hospitals were all included in this analysis. Length of stay was considered for each patient discharged, including patients transferred between different hospital centres (LOS was not summed), in order to capture all hospitalizations. Transfers between hospitals represented only 2.5% ($n = 507$) of the total sample.

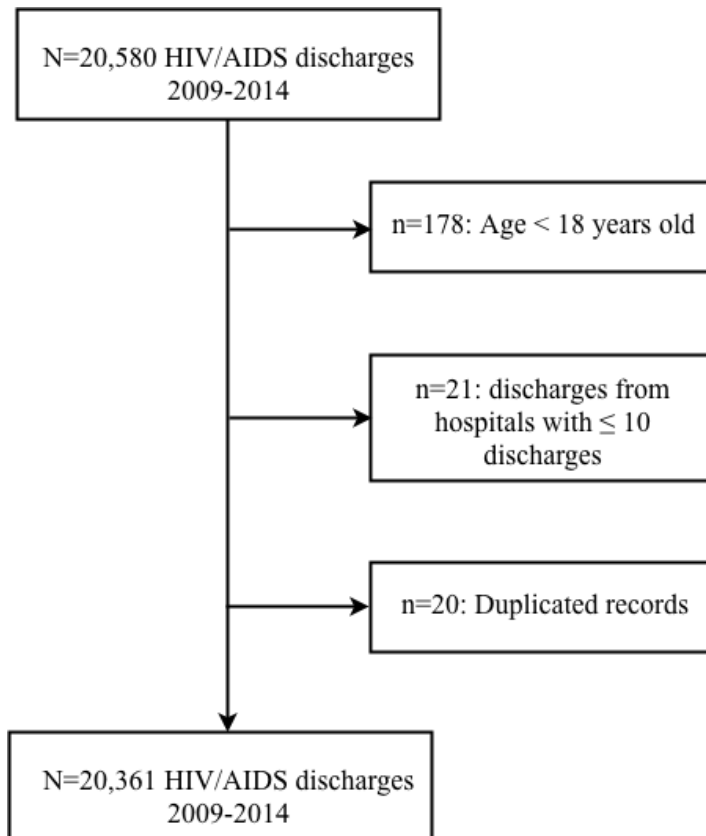


Figure 2.1.1. Selection profile of study population.

2.1.2.3. Outcomes and covariates

The outcome variable was the number of days between hospital admission and discharge dates (LOS). The main explanatory variable was the year, as we aimed to examine the impact of the EFAP, which was implemented in Portugal between May 2011 and May 2014.

We examined three types of covariates: patient, treatment and setting variables.

- Patient covariates considered were: gender, age (at the date of admission), region of residence, type of admission (elective or urgent), readmission within 30 days of discharge, in-hospital mortality, presence of selected co-infections (*Pneumocystis pneumonia*, Hepatitis B, Hepatitis C, and Tuberculosis), HIV/AIDS as principal diagnosis at admission, and the number of secondary diagnosis (obtained as a sum of diagnosis apart from the main diagnosis, in 19 possible cases [29,31]);
- Treatment covariates included: number of procedures (obtained as a sum of procedures in 20 possible cases [29,31]);
- Setting covariates included whether the hospital was merged into a Hospital Centre or not, and the hospital's current ratio

Pneumocystis pneumonia became a common manifestation of HIV infection in the developed world during the 1980s, and frequently resulted in death. Following the introduction of highly active antiretroviral therapy (HAART) in 1996, there was a dramatic decline in the incidence of opportunistic infections in HIV/AIDS patients (including *Pneumocystis pneumonia*). However, despite the major benefits associated with HAART, *Pneumocystis pneumonia* remains one of the most common AIDS-defining diagnoses and most common causes of AIDS-related death, especially in HIV-infected patients who present late into medical care [32]. Hepatitis B and Hepatitis C are also common co-infections among people living with HIV. The estimated prevalence of hepatitis B among people living with HIV is 5–20%; thus, approximately 2 to 4 million people living with HIV worldwide have chronic hepatitis B coinfection [33,34]. It is estimated that hepatitis C affects 2–15% of people living with HIV worldwide (and up to 90% of those are people who inject drugs [35]). Likewise, Tuberculosis and HIV/AIDS constitute the main burden of infectious disease in resource-limited countries [36]. Some 14 million individuals worldwide are estimated to be dually infected with HIV and Tuberculosis [37] and TB remains the leading cause of death among people living with HIV [38]. The DGR database records the principal and all secondary diagnosis (up to 19) from each discharge using ICD-9 codes. **Table 2.1.1** shows the ICD-9 codes used to identify HIV and selected co-infections in the DRG dataset provided.

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Table 2.1.1. ICD-9 codes and description for the selected diagnosis.

<i>ICD-9 codes</i>	<i>Description</i>
070.2 – 070.3	Hepatitis B
070.7	Hepatitis C
042	Human immunodeficiency virus (HIV) infection
136.3	Pneumocystosis
010 – 018	Tuberculosis

In the beginning of the 2000s, the NHS hospital network was reformed. Firstly, hospitals were transformed in public enterprises (2005) with the aim of promoting autonomous management and improve efficiency. Secondly, some hospitals were grouped into Hospital Centres. The rationale behind the creation of Hospital Centres was to improve efficiency through better coordination between institutions providing hospital care in the same geographical area [39]. The process of merging hospitals took place over for several years, this explains why there were important changes during the study period (2009–2014): in 2009 there were 46 hospital institutions and in 2014 there were 41, and therefore different codes in the dataset provided by ACSS correspond currently to the same Hospital Centre. In order to have the same number of institutions during the study period, hospitals were coded according to their current status, as to simulate the Hospital Centre of which they are currently part of, and a dummy variable was added to measure the effect of this merger.

Finally, a variable measuring the hospital’s financial situation was added to this analysis. The current ratio is a liquidity ratio that measures a company’s ability to pay short-term and long-term obligations. To measure this ability, the current ratio considers the current total assets of a company (both liquid and illiquid) relative to that company’s current total liabilities [40], as follows:

$$\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

The annual current ratio for each hospital institution in the DRG dataset was taken from the annual report and accounts from each hospital between 2009 and 2014.

2.1.2.4. Statistical analysis

The skewness and heterogeneity of LOS is a challenge for statistical analysis [41,42]. Particularly, HIV/AIDS LOS has 6–7% of outliers and its distribution is very asymmetric [31]. LOS has been analysed using many different methods. For example, Barbour *et al.* studied changes among HIV/AIDS inpatients using a multivariable linear regression model [43], while Huang *et al.* analysed LOS and costs based on a generalised linear mixed model [44]. Other authors, like Wang *et al.*, analysed maternity LOS from a two-component Poisson mixed model [45]. However, researchers must take into consideration that hospitalizations from the same hospital are often correlated, since ignoring the dependence of clustered data may lead to illegitimate associations and false interpretations [45].

Hierarchical Poisson regression model was specified to analyse the relation between LOS and the covariates. In DRG data, patients are nested within hospitals on the basis of their own choices which can range from place of residence, trust in a particular doctor, or even the hospital’s reputation. This important element breaks the independence assumptions of classical regression analysis. Hence, hierarchical modelling is considered a more suitable statistical method when using multilevel structured data, like patients clustered within hospitals [46]. Additionally, the recognition of hospital random effects, which are nevertheless important, can be used to explain variations in hospital quality/performance [42].

Let y_{ij} ($i = 1, 2, \dots, m$; $j = 1, 2, \dots, n_i$) the count variable (LOS) of the j^{th} observation (hospitalizations) in the i^{th} hospital, where m is the number of hospitals and

$$\sum_{i=1}^m n_i = n$$

is the sample size. The generalised linear model takes the form:

$$\theta_{ij} = \eta_{ij} = \chi_{ij}\beta + v_i$$

where χ_{ij} is vector with covariates with regression coefficients β , and v_i is assumed to be independent and normal distribution.

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We used a mediation analysis to check if year dummies vary whether the current ratio is included or not.

All statistical analyses were performed using statistical software R and its library MASS and package *glmmPQL*.

2.1.3. Results

The overall median length of stay (LOS) was 11 days (IQR = 16). **Table 2.1.2** shows the summary statistics of hospitalization according to discharge episodes characteristics.

Out of 20,361 discharges, 14,628 (71.8%) were male and the median age was 44 years (IQR = 15). During the study period, the median number of secondary diagnoses was 7 (IQR = 5) and the median number of procedures was 8 (IQR = 7). The majority of hospitalizations corresponded to patients living in the Lisbon and the Tagus Valley region (53.3%). During the study period (2009–2014), there was a steady decrease in the number of hospitalizations (**Table 2.1.2**), while the majority corresponded to urgent admissions (83.4%). The most common HIV-related infections among hospitalizations between 2009 and 2014 were tuberculosis (43.6%) and hepatitis C (28.0%). In-hospital mortality during the same period was 12.6%.

The hierarchical Poisson model as estimated by penalised quasi-likelihood and the majority of covariates have a significant impact in LOS (**Table 2.1.3**). Although age is not statistically significant, it was retained in the model to control for possible confounding.

Table 2.1.2. Characteristics of HIV discharges in Portuguese NHS hospitals, 2009-2014.

Variables	2009	2010	2011	2012	2013	2014	Total
Discharges, N	3,864	3,735	3,576	3,538	3,146	2,502	20,361
Length of stay (days); mean (\pm SD)	18.63 \pm 24.17	18.00 \pm 22.40	17.59 \pm 22.56	17.19 \pm 22.04	17.31 \pm 20.95	18.42 \pm 23.08	17.85 \pm 22.59
Age (years); median (IQR)	41 (14)	43 (15)	44 (15)	44 (16)	45 (15)	46 (15)	44 (15)
No. secondary diagnoses; median (IQR)	6 (4)	6 (5)	6 (5)	7 (6)	8 (6)	8 (6)	7 (5)
No. procedures; median (IQR)	8 (6)	8 (6)	8 (6)	8 (6)	8 (7)	9 (7)	8 (7)
Gender; n (%)							
Male	2,783 (72.02)	2,658 (71.16)	2,571 (71.90)	2,538 (71.74)	2,282 (72.54)	1,796 (71.78)	14,628 (71.84)
Female	1,081 (27.98)	1,077 (28.84)	1,005 (28.10)	1,000 (28.26)	864 (27.46)	706 (28.22)	5,733 (28.16)
Region of residence; n (%)							
North	1,025 (16.53)	938 (25.11)	860 (24.05)	856 (24.19)	803 (25.52)	568 (22.70)	5,050 (24.80)
Centre	472 (12.22)	526 (14.08)	488 (13.65)	466 (13.17)	436 (13.86)	368 (14.71)	2,756 (13.54)
Lisbon and the Tagus Valley	1,986 (51.40)	1,968 (52.69)	1,950 (54.53)	1,920 (54.27)	1,628 (51.75)	1,396 (55.80)	10,848 (53.28)
Alentejo	50 (1.29)	45 (1.20)	39 (1.09)	40 (1.13)	34 (1.08)	29 (1.16)	237 (1.16)
Algarve	258 (6.68)	203 (5.44)	213 (5.96)	232 (6.56)	227 (7.22)	125 (5.00)	1,258 (6.18)
Other	73 (1.89)	55 (1.47)	26 (0.73)	24 (0.68)	18 (0.57)	16 (0.64)	212 (1.04)
Type of admission; n (%)							
Elective	533 (13.79)	538 (14.40)	590 (16.50)	726 (20.52)	567 (18.02)	426 (17.03)	3,380 (16.60)
Urgent	3,331 (86.21)	3,197 (85.60)	2,986 (83.50)	2,812 (79.48)	2,579 (81.98)	2,076 (82.97)	16,981 (83.40)
Readmission within 30 days; n (%)							
No	3,405 (88.12)	3,263 (81.36)	3,177 (88.84)	3,141 (88.78)	2,817 (89.54)	2,227 (89.01)	18,030 (88.55)
Yes	459 (11.88)	472 (12.64)	399 (11.16)	397 (11.22)	329 (10.46)	275 (10.99)	2,331 (11.45)
In-hospital mortality; n (%)							
No	3,306 (85.56)	3,248 (86.96)	3,140 (87.81)	3,131 (88.50)	2,766 (87.92)	2,204 (88.09)	17,795 (87.40)
Yes	508 (14.44)	487 (13.04)	436 (12.19)	407 (11.50)	380 (12.08)	298 (11.91)	2,566 (12.60)
HIV/AIDS as principal diagnosis; n (%)							
No	953 (24.66)	979 (26.21)	1,075 (30.06)	998 (28.21)	1,108 (35.22)	512 (20.46)	5,625 (27.63)
Yes	2,911 (75.34)	2,756 (73.79)	2,501 (69.94)	2,540 (71.79)	2,038 (64.78)	1,990 (79.54)	14,736 (72.37)
Pneumocystis pneumonia; n (%)							
No	3,610 (93.43)	3,439 (92.07)	3,315 (92.70)	3,284 (92.82)	2,920 (92.82)	2,300 (91.93)	18,868 (92.67)
Yes	254 (6.57)	296 (7.93)	261 (7.30)	254 (7.18)	226 (7.18)	202 (8.07)	1,493 (7.33)
Hepatitis B; n (%)							
No	3,699 (95.73)	3,580 (95.85)	3,382 (94.57)	3,386 (95.70)	2,985 (94.88)	2,379 (95.08)	19,411 (95.33)
Yes	165 (4.27)	155 (4.15)	194 (5.43)	152 (4.30)	161 (5.12)	123 (4.92)	950 (4.67)
Hepatitis C; n (%)							
No	2,796 (72.36)	2,726 (72.99)	2,530 (70.75)	2,520 (71.23)	2,283 (72.57)	1,802 (71.02)	14,657 (71.99)
Yes	1,068 (27.64)	1,009 (27.01)	1,046 (29.25)	1,018 (28.77)	863 (27.43)	700 (27.98)	5,704 (28.01)
Tuberculosis; n (%)							
No	2,118 (54.81)	2,039 (54.59)	2,008 (46.15)	2,100 (59.36)	1,828 (58.11)	1,382 (55.24)	11,475 (56.36)
Yes	1,746 (45.19)	1,696 (45.41)	1,568 (43.85)	1,438 (40.64)	1,318 (41.89)	1,120 (44.76)	8,886 (43.64)

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In contrast with the estimated coefficient of the variable that measured hospital mergers, estimated coefficients of year dummies remained statistically significant after introducing the variable current status in the model (**Table 2.1.3**). Thus, adjusting for other factors, patients hospitalized during 2010 and 2011 had an estimated LOS 0.092 and 0.109% lower, respectively, than those hospitalized in 2009, while patients hospitalized in 2012, 2013 and 2014 had an estimated LOS 0.186, 0.268 and 0.262% lower than those hospitalized in 2009 (**Table 2.1.3**).

Adjusting for other variables, estimated LOS was lower for hospitalizations resulting in death, for women, and for patients with urgent admission (**Table 2.1.3**). Patients with urgent admission had an estimated LOS 0.068% lower than those with elective admission (**Table 2.1.3**). In contrast, patients with higher number of diagnosis (or higher number of procedures) have a higher estimated HIV/AIDS LOS. Adjusting for other variables, one additional number of secondary diagnosis increased LOS by 0.043%, while one additional number of procedures increased LOS by 0.085% (**Table 2.1.3**).

Adjusting for other factors, when analysing selected co-morbidities, patients co-infected with *Pneumocystis* pneumonia and hepatitis C had an estimated LOS 0.129 and 0.126% shorter, respectively, than those without those co-infections (**Table 2.1.3**). In contrast, patients co-infected with tuberculosis had an estimated LOS 0.391% longer than those without TB. Finally, patients having HIV/AIDS as a principal diagnosis had an estimated LOS 0.085% longer than those with other principal diagnosis (**Table 2.1.3**).

Table 2.1.3. Hierarchical Poisson regression models estimation for HIV/AIDS LOS, 2009-2014.

Variables	Model 1		Model 2	
	Coefficient	p-value	Coefficient	p-value
Intercept	1.668	<0.001	1.837	<0.001
Gender (Female)	-0.041	0.001	-0.039	0.011
Age	-0.001	0.118	-0.001	0.137
Year 2010 (reference 2009)	-0.060	0.006	-0.092	<0.001
Year 2011 (reference 2009)	-0.068	0.003	-0.109	<0.001
Year 2012 (reference 2009)	-0.135	<0.001	-0.186	<0.001
Year 2013 (reference 2009)	-0.214	<0.001	-0.268	<0.001
Year 2014 (reference 2009)	-0.238	<0.001	-0.262	<0.001
No. secondary diagnoses	0.044	<0.001	0.043	<0.001
No. procedures	0.084	<0.001	0.085	<0.001
Urgent admission	-0.069	<0.001	-0.068	<0.001
Readmission within 30 days	-0.039	0.079	-0.040	0.080
In-hospital mortality	-0.139	<0.001	-0.142	<0.001
HIV/AIDS as principal diagnosis	0.084	<0.001	0.085	<0.001
Pneumocystis pneumonia	-0.131	<0.001	-0.129	<0.001
Hepatitis C	-0.126	<0.001	-0.126	<0.001
Tuberculosis	0.392	<0.001	0.391	<0.001
Hospital merge	0.081	0.001	0.046	0.066
Current ratio	-----	-----	-0.144	<0.001

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Hospital random effects were estimated to capture differences in unexplained variance in LOS across hospitals, after controlling for all other characteristics. **Figure 2.1.2** shows these random effects and their respective 95% confidence intervals for the 41 hospitals analysed.

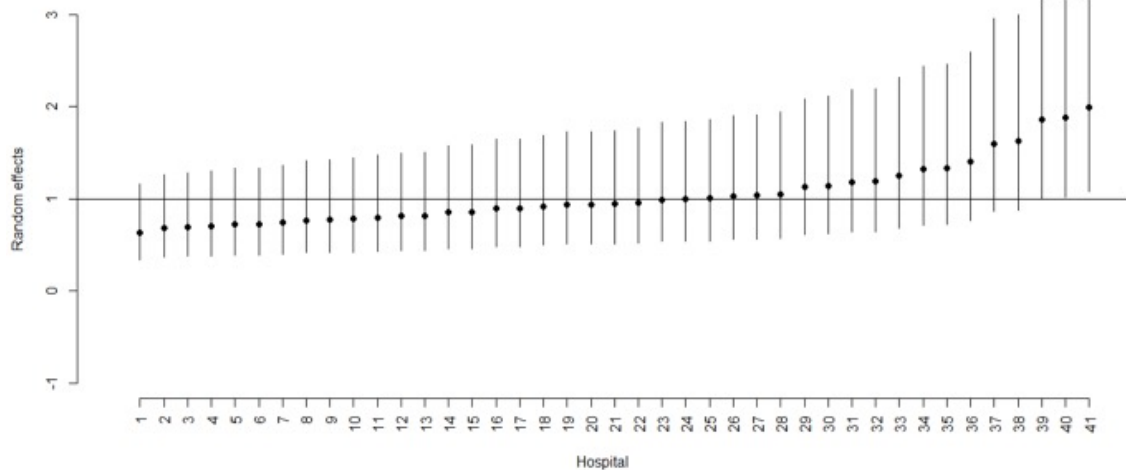


Figure 2.1.2. Random effects and 95% Confidence Intervals for each hospital.

For the period 2009–2014, most hospitals had an estimated random effect closer to the mean value (one). However, two hospitals (40 and 41) showed a large positive effect, extending patients' length of stay.

2.1.4. Discussion

The constant decline in HIV-related hospitalizations during the period 2009–2014 is in line with what was observed in other studies [47]. In fact, the decrease in HIV incidence observed in Portugal suggests success in controlling the HIV epidemics in Portugal, following the worldwide trend [48]. In our analysis, most HIV patients (71.8%) hospitalized during the study period were men, which can be explained by the fact that, like in the rest of Europe, most of HIV patients in Portugal are men [49]. Therefore, estimated LOS was lower for female patients and longer for male patients. Over the study period, the median age of HIV patients hospitalized increased slightly, suggesting that

PLHIV are living longer, as demonstrated by other studies [47]. While urgent admissions have decreased steadily between 2009 and 2014 (-37.7%) – having dropped by 10.4% between 2009 and 2011 and by 26.2% between 2012 and 2014 – elective admissions increased until 2012 (+36.2%) but declined in the following 2 years (-41.3%).

This study specifies a hierarchical Poisson regression to model HIV/AIDS LOS in Portuguese public hospitals. The estimated LOS of HIV/AIDS patients hospitalized in each year between 2010 and 2014 was significantly shorter than those hospitalized in 2009. A recent study carried out in Portugal analysed all in-patient stays at all Portuguese NHS hospitals over the 2001–2012 period and found that the volume of in-patient stays, particularly non-elective stays, increased significantly, while the length of stay has become shorter and elective admissions have decreased [1]. Although our analysis included HIV/AIDS patients only, and the study period was different, we found similar results regarding the shorter LOS and the decrease of elective admissions.

The decrease of LOS for HIV/AIDS hospitalizations found in our analysis could be explained by two different hypotheses. The first one is that the EFAP measures might have induced efficiency gains, improving response from healthcare units. In contrast, the EFAP measures might have reduced quality of care provided in hospitals, with a reduction of the number of in-patient beds and increasing pressure to reduce LOS and cut costs [50]. However, our findings are not sufficient to support one hypothesis over another and further research is needed. Our results showed that the hospital's financial situation affected HIV/AIDS patients' hospitalizations: a greater current ratio decreased estimated LOS. This finding is supported by other studies that show a strong negative association between LOS and hospitals' operating margins [51]. Long hospitalizations consume many hospital resources and are, therefore, associated with increasing costs. The year dummies remained statistically significant in Model 2, even after introducing the variable measuring hospitals' current status. The fact that the annual decrease in LOS for HIV/AIDS patients was not explained by the hospitals' current status, suggests a generalised pressure to reduce costs not fully related with the hospitals' financial situation. By 2011, NHS hospitals were facing a severe financial situation, with the total amount of arrears (accounts payable to domestic suppliers past due date by 90 days) reaching EUR 3.0 billion [2]. Following the economic and financial adjustment

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programme (EFAP), a number of cost-containment measures and actions aimed at increasing efficiency in the health sector were implemented between 2012 and 2014. The Memorandum of Understanding clearly established the reduction of hospitals' operating costs as a priority, which is the reason why NHS hospitals were under continuous pressure to cut costs during the period of the EFAP. Our findings suggest that this was an important contributor for the decrease of LOS among HIV/AIDS patients.

While patients' age is not statistically significant at the 5% level, when adjusting for other factors the estimated LOS was significantly lower for patients who died, suggesting that mortality occurs mostly at an early stage of hospitalization. This means that there is high mortality among those patients who are admitted at the hospital in more severe stages of AIDS-related illness, as supported by other studies [42]. Both the number of secondary diagnoses and the number of procedures significantly increase LOS, suggesting longer hospitalizations. A greater number of diagnoses or procedures suggests a more severe condition of the patient admitted and therefore leads to a delayed discharge [52]. Also, estimated LOS was longer for patients who had HIV/AIDS as principal diagnosis, suggesting that those patients are admitted in a more severe condition and are therefore more likely to need a longer hospitalization.

The estimated LOS for HIV/AIDS patients was shorter for urgent admissions. It is important to highlight that, in Portugal, urgent admissions do not necessarily reflect emergency situations, as noted by previous studies [42]. Due to difficulties in accessing lower levels of care, it is not uncommon that patients seek assistance directly at a hospital emergency service, thus bypassing primary healthcare [53].

The variable measuring the effect of hospital mergers into hospital centres on estimated LOS for HIV/AIDS patients was not statistically significant in Model 2, after introducing the variable current status. Mergers can be a way of eliminating excess capacity and cutting costs, and additionally they can address performance issues for particular units or services. Hospital mergers in Portugal began in 1999 but were intensified in recent years, as a result of the economic and financial adjustment programme (EFAP) [4]. By concentrating within the same administration hospitals operating in the same geographic area and offering the same services, the aim was to increase efficiency and promote economies of scale. However, results from our study suggest the opposite, considering

LOS as an indicator of hospital efficiency. Regarding recent mergers, the literature suggests that there are economies of scale and scope to explore further, but only mergers of relatively small and similar hospitals have been successful [54]. In fact, hospital mergers in Portugal did not achieve the expected efficiency gains due to the heterogeneity and geographical dispersion of many hospitals. As a result, despite being under the same administration, many hospitals kept the same practices as they had prior to being merged with other hospitals.

Estimated hospital random effects suggest differences amongst hospitals which also require the need for further research. These effects which acknowledge unexplained factors that are nonetheless important, can be interpreted as differences in hospital efficiency, after controlling for all relevant factors. Hospitals 40 and 41 showed a positive effect, extending LOS for HIV/AIDS patients. Hospital 40 corresponds to a hospital centre in northern Portugal, geographically dispersed and with no differentiated services, while hospital 41 is a large hospital in the Lisbon metropolitan area, offering more differentiated services.

Our study provides an analysis of relevant factors related to LOS among HIV/AIDS hospitalizations between 2009 and 2014 in Portugal. However, it is important to note that healthcare-associated infections have a high prevalence in Portugal – overall prevalence rate of 10.5% in 2013 [55] – and are responsible for greater medical costs, longer LOS, and an increase in mortality rates. Our analysis did not include other types of pneumonia or urinary tract infections, which are major complications from nosocomial infections, as covariates, but the findings for *pneumocystis* pneumonia should prompt further research. Although the EFAP, in place between May 2011 and May 2014, and the severe economic recession in Portugal brought important social and economic consequences in Portugal, the interpretation of our findings must be carried out with caution. Between 2012 and 2014, Portugal also witnessed changes in the National Network of Long Term Care which was expanded and might have influenced the overall reduction in LOS among patients in Portuguese NHS hospitals. Our analysis did not address the potential impact of that support network. In fact, an aspect of the whole system performance that is ignored in this analysis is the impact of hospital performance on other sectors within the health

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system. For instance, it could be the case that the decrease of LOS is being secured at the expense of heavy workloads for rehabilitative and primary care services [56].

This study used comprehensive discharge data compiled in mainland Portugal, and these findings are more generalisable than results based on data from a single hospital. However, this study has limitations, due to the nature of the data [57]. Firstly, there are limitations regarding the retrospective collection of data for administrative purposes, which can allow for mistakes in recording information and/or variability of coding among hospitals. Secondly, the DRG database has very limited clinical information, which would have been important to better understand the clinical profile of HIV/AIDS patients (e.g. the number of years the patient is engaged in care, viral load, CD4 cell count, ART regime). To track the long-term outcomes and quality of care, further research is needed on the information system specially implemented in NHS hospitals in Portugal to capture these important components of HIV-related care (*SI.VIDA*). Also, in this analysis, the number of secondary diagnosis was used as a proxy of the number of co-morbidities, and therefore as an indicator of the patient's condition. However, this approach reveals nothing about the severity of each secondary diagnosis and does not measure their severity. Future research could consider the use of Elixhauser Comorbidity Index or Charlson Comorbidity Index [58,59], which have been widely utilised by health researchers to measure burden of disease and case mix.

The fact that hospital institutions were coded in the DRG database according to the hospital centre to which they belong may have prevented a more detailed analysis of the data. Although a dummy variable was considered to capture the aggregation of hospitals into hospital centres, it would be interesting to explore, within a single hospital centre, differences among institutions regarding risk-adjusted LOS.

Finally, the selected study period is also a limitation of this analysis. Although the main objective was to measure the impact of the EFAP on hospital in-patient care for PLHIV, the analysis over a longer period would have allowed us to better identify and measure the austerity effect from the long-term trends in LOS.

2.1.5. Conclusions

The subject of the impacts of the economic crisis on the health of the population has been the focus of many studies in recent years [5-7]. Health policy research in this field poses important methodological challenges as it is often difficult to distinguish austerity measures from the overall economic crisis and its impact on health systems. Therefore, the model presented in this study aims to contribute to the analysis of the effects of the economic and financial adjustment programme on a particular group of patients.

This study presents a hierarchical Poisson model to analyse LOS among HIV/AIDS patients in Portuguese public hospitals. A number of variables (HIV/AIDS as principal diagnosis, number of secondary diagnoses, number of procedures and tuberculosis) were found to increase LOS, while others (in-hospital mortality, urgent admission, *Pneumocystis* pneumonia and hepatitis C) contributed to the decrease of LOS. Our findings also show that LOS decreased during the study period, and elective admissions decreased after 2012. Our findings also showed that hospital's current ratio was found to decrease LOS, meaning that the better the financial situation, the lower the LOS for HIV/AIDS patients. With regard to HIV/AIDS hospitalizations, two of the analysed hospitals showed a large positive effect, extending patients' length of stay.

These findings are a contribution to the study of the effects of the austerity measures implemented in Portugal between 2011 and 2014 in hospital care provision to a particular vulnerable group of patients. Our analysis suggests that the measures in place to cut costs and increase efficiency in public hospitals contributed to the decrease of HIV/AIDS patients' LOS.

Results from this analysis demonstrate the need to further study this issue in order to better understand the effects of the EFAP on health and health care. Additionally, it would be important to implement measures to efficiently monitor health care delivery, particularly during periods of financial constraints.

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2.1.6. References

1. Perelman J, Felix S, Santana R. The great recession in Portugal: impact on hospital care use. *Health Policy*. 2015; 119(3): 307–315. DOI: <http://doi.org/10.1016/j.healthpol.2014.12.015>
2. Augusto GF. Cuts in Portugal's NHS could compromise care. *Lancet*. 2012; 379(9814):400. DOI: [http://doi.org/10.1016/s0140-6736\(12\)60174-3](http://doi.org/10.1016/s0140-6736(12)60174-3)
3. Barros PP. Health policy reform in tough times: the case of Portugal. *Health Policy*. 2012;106(1):17–22. DOI: <http://doi.org/10.1016/j.healthpol.2012.04.008>
4. Portugal – Memorandum of understanding on specific economic policy conditionality, 17 May 2011. http://ec.europa.eu/economy_finance/eu_borrower/mou/2011-05-18-mou-portugal_en.pdf. Accessed 27 September 2018.
5. Karanikolos M, Kentikelenis A. Health inequalities after austerity in Greece. *Int J Equity Health*. 2016;15:83. DOI: <http://doi.org/10.1186/s12939-016-0374-0>
6. Karanikolos M, Mladovsky P, Cylus J, Thomson S, Basu S, Stuckler D, Mackenbach JP, McKee M. Financial crisis, austerity, and health in Europe. *Lancet*. 2013;381(9874):1323–1331. DOI: [http://doi.org/10.1016/S0140-6736\(13\)60102-6](http://doi.org/10.1016/S0140-6736(13)60102-6)
7. García-Gómez P, Jiménez-Martín S, Labeaga JM. Consequences of the economic crisis on health and health care systems. *Health Econ*. 2016;25(Suppl 2):3-5. DOI: <http://doi.org/10.1002/hec.3442>
8. Van Doorslaer E, Wagstaff A, Van der Burg H, Christiansen T, DeGraeve D, Duchesne I, *et al*. Equity in the delivery of health care in Europe and the US. *J Health Econ*. 2000;19(5):553–583. DOI: [https://doi.org/10.1016/S0167-6296\(00\)00050-3](https://doi.org/10.1016/S0167-6296(00)00050-3)
9. Perelman J, Closon M-C. Impact of socioeconomic factors on in-patient length of stay and their consequences in per case hospital payment systems. *J Health Serv Res Policy*. 2011;16(4):197–202. DOI: <http://doi.org/10.1258/jhsrp.2011.010047>
10. Kondilis E, Giannakopoulos S, Gavana M, Ierodiakonou I, Waitzkin H, Benos A. Economic crisis, restrictive policies, and the population's health and health care:

- the Greek case. *Am J Public Health*. 2013; 103(6): 973–979. DOI: <http://doi.org/10.2105/AJPH.2012.301126>
11. Bernal JAL, Gasparrini A, Artundo CM, McKee M. The effect of the late 2000s financial crisis on suicides in Spain: an interrupted time-series analysis. *Eur J Pub Health*. 2013;23(5):732–736. DOI: <http://doi.org/10.1093/eurpub/ckt083>
 12. Barr B, Taylor-Robinson D, Scott-Samuel A, McKee M, Stuckler D. Suicides associated with the 2008–10 economic recession in England: time trend analysis. *BMJ*. 2012;345:e5142. DOI: <http://doi.org/10.1136/bmj.e5142>
 13. Reeves A, Stuckler D, McKee M, Gunnell D, Chang S-S, Basu S. Increase in state suicide rates in the USA during economic recession. *Lancet*. 2012;380(9856):1813–1814. DOI: [http://doi.org/10.1016/S0140-6736\(12\)61910-2](http://doi.org/10.1016/S0140-6736(12)61910-2)
 14. Economou M, Madianos M, Peppou LE, Patelakis A, Stefanis CN. Major depression in the era of economic crisis: a replication of a cross-sectional study across Greece. *J Affect Disord*. 2012; 145(3): 308–314. DOI: <http://doi.org/10.1016/j.jad.2012.08.008>
 15. Economou M, Madianos M, Peppou LE, Theleritis C, Patelakis A, Stefanis C. Suicidal ideation and reported suicide attempts in Greece during the economic crisis. *World Psychiatry*. 2013; 12(1): 53–59. DOI: <http://doi.org/10.1002/wps.20016>
 16. Gili M, Roca M, Basu S, McKee M, Stuckler D. The mental health risks of economic crisis in Spain: evidence from primary care centres, 2006 and 2010. *Eur J Pub Health*. 2013;23(1):103–108. DOI: <http://doi.org/10.1093/eurpub/cks035>
 17. Kentikelenis A, Karanikolos M, Papanicolas I, Basu S, McKee M, Stuckler D. Health effects of financial crisis: omens of a Greek tragedy. *Lancet*. 2011; 378(9801): 1457–1458. DOI: [http://doi.org/10.1016/S0140-6736\(11\)61556-0](http://doi.org/10.1016/S0140-6736(11)61556-0)
 18. Zavras D, Tsiantou V, Pavi E, Mylona K, Kyriopoulos J. Impact of economic crisis and other demographic and socio-economic factors on self-rated health in

2. RESULTS

- Greece. *Eur J Pub Health*. 2013;23(2):206–210. DOI: <http://doi.org/10.1093/eurpub/cks143>
19. VANDOROS S, HESSEL P, LEONE T, AVENDANO M. Have health trends worsened in Greece as a result of the financial crisis? A quasi-experimental approach. *Eur J Pub Health*. 2013;23(5):727–731. DOI: <http://doi.org/10.1093/eurpub/ckt020>
20. RUHM CJ. Understanding the relationship between macroeconomic conditions and health. In: *The Elgar companion to health economics*. Northampton: Edward Elgar Publishing; 2011.
21. LEGIDO-QUIGLEY H, KARANIKOLOS M, HERNANDEZ-PLAZA S, DE FREITAS C, BERNARDO L, PADILLA B, *et al*. Effects of the financial crisis and troika austerity measures on health and health care access in Portugal. *Health Policy*. 2016;120(7):833–839. DOI: <http://doi.org/10.1016/j.healthpol.2016.04.009>
22. KENTIKELENIS A, KARANIKOLOS M, REEVES A, MCKEE M, STUCKLER D. Greece's health crisis: from austerity to denialism. *Lancet*. 2014;383(9918):748–753. DOI: [http://doi.org/10.1016/S0140-6736\(13\)62291-6](http://doi.org/10.1016/S0140-6736(13)62291-6)
23. LEGIDO-QUIGLEY H, MONTGOMERY CM, KHAN P, ATUN R, FAKOYA A, GETAHUN H, GRANT AD. Integrating tuberculosis and HIV services in low- and middle-income countries: a systematic review. *Tropical Med Int Health*. 2013;18(2):199–211. DOI: <http://doi.org/10.1111/tmi.12029>
24. KENTIKELENIS A. Bailouts, austerity and the erosion of health coverage in southern Europe and Ireland. *Eur J Pub Health*. 2015;25(3):365–366. DOI: <http://doi.org/10.1093/eurpub/ckv055>
25. RECHEL B, SUHRCKE M, TSOLOVA S, SUK JE, DESAI M, MCKEE M, STUCKLER D, ABUBAKAR I, HUNTER P, SENEK M, SEMENZA JC. Economic crisis and communicable disease control in Europe: a scoping study among national experts. *Health Policy*. 2011;103(2–3):168–175. DOI: <http://doi.org/10.1016/j.healthpol.2011.06.013>

26. UNAIDS – Joint United Nations Programme on HIV/AIDS . *The global economic crisis and HIV prevention and treatment programmes: vulnerabilities and impact*. Geneva: UNAIDS/WHO; 2009.
https://www.unaids.org/sites/default/files/media_asset/jc1734_econ_crisis_hiv_response_en_0.pdf. Accessed 27 September 2018.
27. Perelman J, Alves J, Miranda AC, Mateus C, Mansinho K, Antunes F, Oliveira J, Poças J, Doroana M, Marques R, Teófilo E, Pereira J. Direct treatment costs of HIV/AIDS in Portugal. *Rev Saude Publica*. 2013;47(5):865–872. DOI: <http://doi.org/10.1590/s0034-8910.2013047004598>
28. Mateus C. Portugal: Results of 25 years of experience with DRGs In: Busse R, Geissler A, Quentin W, Wiley M, editors. *Diagnosis-related groups in Europe moving towards transparency, efficiency and quality in hospitals*. Maidenhead: Open University Press; 2011.
http://www.euro.who.int/_data/assets/pdf_file/0004/162265/e96538.pdf. Accessed 27 September 2018.
29. Dias SS, Andreozzi V, Martins MO, Torgal J. Predictors of mortality in HIV-associated hospitalizations in Portugal: a hierarchical survival model. *BMC Health Serv Res*. 2009;9:125. DOI: <http://doi.org/10.1186/1472-6963-9-125>
30. Dias SS, Martins MFO. HIV/AIDS length of stay outliers. *Proc Comput Sci*. 2015;64:984–992. DOI: <http://doi.org/10.1016/j.procs.2015.08.617>
31. Xiao J, Lee AH, Vemuri SR. Mixture distribution analysis of length of hospital stay for efficient funding. *Socio-Econ Plan Sci*. 1999;33(1):39–59. DOI: [http://doi.org/10.1016/S0038-0121\(98\)00006-8](http://doi.org/10.1016/S0038-0121(98)00006-8)
32. Siegel M, Masur H, Kovacs J. *Pneumocystis jirovecii* pneumonia in human immunodeficiency virus infection. *Semin Respir Crit Care Med*. 2016;37(02):243–256. DOI: <http://doi.org/10.1055/s-0036-1579556>
33. Konopnicki D, Mocroft A, de Wit S, Antunes F, Ledergerber B, Katlama C, *et al*. Hepatitis B and HIV: prevalence, AIDS progression, response to highly active

2. RESULTS

antiretroviral therapy and increased mortality in the EuroSIDA cohort. *AIDS*. 2005;19:593–601. DOI:

<http://doi.org/10.1097/01.aids.0000163936.99401.fe>

34. Kellerman SE, Hanson DL, McNaghten AD, Fleming PL. Prevalence of chronic hepatitis B and incidence of acute hepatitis B infection in human immunodeficiency virus-infected subjects. *J Infect Dis*. 2003;188:571–577. DOI: <http://doi.org/10.1086/377135>
35. Platt L, Easterbrook P, Gower E, McDonald B, Sabin K, McGowan C, Yanny I, Razavi H, Vickerman P. Prevalence and burden of HCV co-infection in people living with HIV: a global systematic review and meta-analysis. *Lancet Infect Dis*. 2016;16:797–808. DOI: [http://doi.org/10.1016/S1473-3099\(15\)00485-5](http://doi.org/10.1016/S1473-3099(15)00485-5)
36. Pawlowski A, Jansson M, Sköld M, Rottenberg ME, Källenius G. Tuberculosis and HIV co-infection. *PLoS Pathog*. 2012;8(2):e1002464. DOI: <http://doi.org/10.1371/journal.ppat.1002464>
37. Getahun H, Gunneberg C, Granich R, Nunn P. HIV infection-associated tuberculosis: the epidemiology and the response. *Clin Infect Dis*. 2010;50:S201–S207. DOI: <http://doi.org/10.1086/651492>
38. Bruchfeld J, Correia-Neves M, Källenius G. Tuberculosis and HIV coinfection. *Cold Spring Harb Perspect Med*. 2015; 5(7): a017871. DOI: <http://doi.org/10.1101/cshperspect.a017871>
39. Simões J, Augusto GF, Fronteira I, Hernandez-Quevedo C. Portugal: Health system review. *Health Syst Transit*. 2017; 19(2): 1-184. http://www.euro.who.int/_data/assets/pdf_file/0007/337471/HiT-Portugal.pdf?ua=1. Accessed 27 September 2018.
40. Brealey R, Myers S, Allen F. Principles of corporate finance. New York: McGraw Hill; 2017.

41. Lee AH, Gracey M, Wang K, Yau KK. A robustified modeling approach to analyze pediatric length of stay. *Ann Epidemiol.* 2005;15(9):673–677. DOI: <http://doi.org/10.1016/j.annepidem.2004.10.001>
42. Dias SS, Andreozzi V, Martins RO. Analysis of HIV/AIDS DRG in Portugal: a hierarchical finite mixture model. *Eur J Health Econ.* 2013;14:715–723. DOI: <http://doi.org/10.1007/s10198-012-0416-5>
43. Barbour KE, Fabio A, Pearlman DN. Inpatient charges among HIV/AIDS patients in Rhode Island from 2000-2004. *BMC Health Serv Res.* 2009;9:3. DOI: <http://doi.org/10.1186/1472-6963-9-3>
44. Huang ZJ, LaFleur BJ, Chamberlain JM, Guagliardo MF, Joseph JG. Inpatient childhood asthma treatment: relationship of hospital characteristics to length of stay and cost: analyses of New York state discharge data, 1995. *Arch Pediatr Adolesc Med.* 2002;156(1):67–72. DOI: <http://doi.org/10.1001/archpedi.156.1.67>
45. Wang K, Yau KK, Lee AH. A hierarchical Poisson mixture regression model to analyse maternity length of hospital stay. *Stat Med.* 2002;21(23):3639–3654. DOI: <http://doi.org/10.1002/sim.1307>
46. Dias SS, Andreozzi V, Martins MO, *et al.* Hierarchical normal mixture model to analyse HIV/AIDS LOS. In: Pacheco A, *et al.*, editors. *New advances in statistical modeling and applications*. Switzerland: Springer International Publishing; 2014. DOI: http://doi.org/10.1007/978-3-319-05323-3_21
47. Catumbela E, Freitas A, Lopes F, Mendoza Mdel C, Costa C, Sarmiento A, da Costa-Pereira A. HIV disease burden, cost, and length of stay in Portuguese hospitals from 2000 to 2010: a cross-sectional study. *BMC Health Serv Res.* 2015;15:144. DOI: <http://doi.org/10.1186/s12913-015-0801-8>
48. UNAIDS – Joint United Nations Programme on HIV/AIDS . *Global Report – UNAIDS report on the global AIDS epidemic 2013*. Geneva: UNAIDS; 2013. http://www.unaids.org/sites/default/files/media_asset/UNAIDS_Global_Report_2013_en_1.pdf. Accessed 27 September 2018.

2. RESULTS

49. ECDC/WHO Europe – European Centre for Disease Prevention and Control/WHO Regional Office for Europe . *HIV/AIDS surveillance in Europe 2015*. Stockholm: ECDC; 2016. http://www.euro.who.int/_data/assets/pdf_file/0019/324370/HIV-AIDS-surveillance-Europe-2015.pdf. Accessed 27 September 2018.
50. Quaglio G, Karapiperis T, Van Woensel L, Arnold E, McDaid D. Austerity and health in Europe. *Health Policy*. 2013;113(1–2):13–19. DOI: <http://doi.org/10.1016/j.healthpol.2013.09.005>
51. Chiang JC, Wang TY, Feng-Jui H. Factors impacting hospital financial performance in Taiwan following implementation of National Health Insurance. *Int Bus Res*. 2014;7(2):43–52. DOI: <http://doi.org/10.5539/ibr.v7n2p43>
52. Singh CH, Ladusingh L. Inpatient length of stay: a finite mixture modeling analysis. *Eur J Health Econ*. 2010;11(2):119–126. DOI: <http://doi.org/10.1007/s10198-009-0153-6>
53. OECD – Organisation for Economic Co-operation and Development. *OECD Reviews of health care quality: Portugal 2015: raising standards*. Paris: OECD Publishing; 2015. <https://www.oecd.org/publications/oecd-reviews-of-health-care-quality-portugal-2015-9789264225985-en.htm>. Accessed 27 September 2018.
54. Azevedo H, Mateus C. Economias de escala e de diversificação: uma análise da bibliografia no contexto das fusões hospitalares [Economies of scale and scope: A literature review in the context of hospital mergers]. *Rev Saude Publica*. 2014;32(1):106–117. DOI; <http://doi.org/10.1016/j.rpsp.2013.12.001>
55. ECDC – European Centre for Disease Prevention and Control . Health inequalities, the financial crisis, and infectious disease in Europe. Stockholm: ECDC; 2013. https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/Health_inequalities_financial_crisis.pdf. Accessed 27 September 2018.
56. Cylus J, Papanicolas I, Smith PC, editors. Health system efficiency – how to make measurement matter for policy and management. *Health policy series, No.*

46. London: WHO Europe; 2016. http://www.euro.who.int/_data/assets/pdf_file/0004/324283/Health-System-Efficiency-How-make-measurement-matter-policy-management.pdf. Accessed 27 September 2018.
57. Freitas JA, Silva-Costa T, Marques B, Costa Pereira A. Implications of data quality problems within hospital administrative databases. In: Pallikarakis N, Bamidis PD, editors. *MEDICON 2010* Volume 29.2010. DOI: http://doi.org/10.1007/978-3-642-13039-7_208
58. Elixhauser A, Steiner C, Harris DR, Coffey RM. Comorbidity measures for use with administrative data. *Med Care*. 1998;36(1):8–27. DOI: <http://doi.org/10.1097/00005650-199801000-00004>
59. Charlson ME, Pompei P, Ales KL, MacKenzie CR. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis*. 1987;40(5):373–383. DOI: [http://doi.org/10.1016/0021-9681\(87\)90171-8](http://doi.org/10.1016/0021-9681(87)90171-8)

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2.2. Preventing HIV under financial constraints: the 2011-12 reform of the Portuguese HIV/AIDS Programme

2.2.1. Background

Since the first case of HIV infection in 1983, Portugal has recorded a total number of 57,913 HIV cases by 2017 [1]. In 2017, Portugal recorded the third highest HIV incidence rate (12.0 new HIV diagnoses per 100,000 population – not adjusted for notification delay) among EU/EEA countries, after Latvia (19.0) and Estonia (16.6) [2].

As in other countries, national response to HIV in Portugal started as a vertical policy programme. The country's national response to HIV goes back to 1985, when the first AIDS Working Group was established [3]; in that same year, a national notification system of HIV infection was enacted, which made it possible to compare the Portuguese epidemic trajectory with other European countries. Antiretroviral treatment (ART) has been fully covered by the universal National Health Service (NHS) and, since 2001, foreign citizens living in Portugal have legally the same access to NHS services, including ART, and the same standard of care as national citizens.

Created in 1990 to replace the AIDS Working Group, the National Commission for the Fight Against AIDS (*Comissão Nacional de Luta Contra a SIDA*) became the official body responsible for coordinating the national HIV response, focusing on prevention, education, research and surveillance [4]. Since the establishment of this group, the country has implemented several policies on HIV, approved new legislation, and developed and implemented new programmes. In 2002, the network of Voluntary Testing and Counselling Centres (*Centros de Aconselhamento e Deteção*, CAD) was launched, aimed at delivering services for voluntary, anonymous, confidential and free HIV testing, as well as pre- and post-counselling.

In 2005, the National Commission Against AIDS was abolished and the National Coordination for HIV/AIDS Infection was created to replace it, within the newly created High-Commissariat for Health [5,6]. This body was intended to provide technical support to policymaking and strategic planning, as well as to produce the National Health Plan (2004-2010) and monitor its execution [7]. Its terms of reference also included the

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coordination of the four vertical programmes: Cardiovascular diseases, Oncologic diseases, Mental health, and HIV/AIDS [7]. The National Coordination for HIV/AIDS Infection was responsible for HIV/AIDS surveillance, leading an integrated information system created for that purpose, as well as for the acquisition and distribution of prevention materials, including syringes, condoms and rapid tests. HIV/AIDS is a mandatory notifiable disease in Portugal since 2005 [8], and the national database of all HIV cases reported in Portugal is maintained by the National Institute of Health (INSA, *Instituto Nacional de Saúde Doutor Ricardo Jorge*), which is the national reference laboratory of the Ministry of Health.

The aim of this paper is to describe and discuss the reform of the HIV/AIDS Programme in Portugal that took place in 2011-12, in the context of severe financial constraints and austerity measures imposed in the country. Results from this analysis are relevant to illustrate how health reforms can be implemented during difficult economic contexts taking into account effectiveness and health outcomes.

2.2.2. Content of the reform: the National Programme for HIV/AIDS Infection

The High-Commissariat for Health was abolished in 2011, in the context of a restructuring of the central services of the Ministry of Health [9]. The global financial and economic crisis in 2008 forced Portugal to request a financial bailout from the European Commission, the International Monetary Fund and the European Central Bank [10-12]. This new financial environment required the containment of costs and improvements in efficiency within all services of the Ministry of Health.

Following the abolition of the High Commissariat for Health, the Directorate-General of Health (DGS, *Direção-Geral da Saúde*) saw its competencies reinforced. This body became responsible for all vertical programmes and for the National Health Plan [9,13]. Thus, the National Coordination for HIV/AIDS Infection was succeeded by the National Programme for HIV/AIDS Infection, as part of a set of nine priority health programmes, including diabetes, cerebro-cardiovascular diseases, oncological diseases, mental health, tobacco control, respiratory diseases, healthy nutrition, prevention and control of antimicrobial resistance and infections, and HIV/AIDS [13,14]. Each priority health programme is organised in accordance with the national health strategies, as included in

the new National Health Plan (2012-2016, extended to 2020), and has a four-year term. More recently, three additional priority health programmes were established: viral hepatitis, physical activity, and tuberculosis [14].

The strategic guidelines followed by the National Programme for HIV/AIDS Infection for the term 2012-2016 were aligned with the UNAIDS goals, and were informed from inputs by different stakeholders, including patients' associations and civil society organisations [15]. The goals to be achieved by the end of 2016 were [15]:

- Decrease new HIV Infections in Portugal by 25%;
- Decrease from 65% to 35% late HIV diagnosis ($CD4 < 350\text{mm}^3$);
- Decrease new AIDS cases by 50%;
- Decrease AIDS-related deaths by 50%;
- Increase to 95% the proportion of individuals reporting condom use in casual sex;
- Eliminate mother-to-child transmission of HIV.

In summary, the main purpose of the reform was to integrate national HIV response among the set of priority health programmes targeting main diseases and risk factors in the Portuguese population. This reform also follows the increasing shift in the global response to the HIV epidemic towards an integrated approach that strengthens health systems and improves all health outcomes while striving towards the goal of universal access to HIV prevention and treatment [16]. Accordingly, 2010 WHO guidelines for HIV treatment presented a public health approach and called for an integration of HIV services in the countries' health systems [16]. In general terms, the new National Programme for HIV/AIDS Infection kept the same approach to HIV prevention strategies initiated by the National Coordination, but experienced important budgetary and organizational changes.

2.2.3. Process of the reform

The restructuring of the national HIV Programme, following the abolition of the National Coordination for HIV/AIDS Infection, was a challenging process. By 2012, the Portuguese Government adopted a series of austerity measures, with severe cuts in public expenditure that included the health sector and public health programmes [10-12]. Thus,

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the new National Programme for HIV/AIDS Infection was forced to rearrange its internal functioning and to take actions to improve the efficiency of available resources [17]. The National Coordination for HIV/AIDS Infection was followed by a programme with fewer human resources which still had to deal with severe demands for public health.

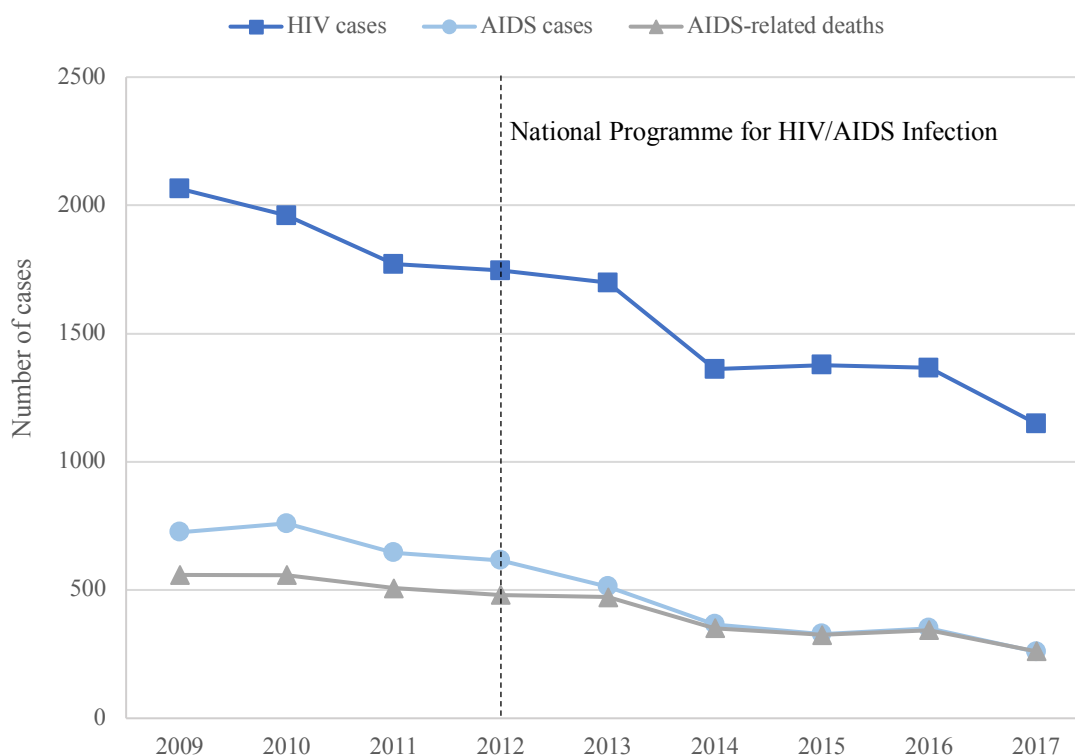
Although main stakeholders were neutral regarding this reform, civil society organisations were strongly opposed to these changes due to a loss in the programme's autonomy, increased bureaucracy and reduced funds available.

From 2011-2012, there was a delay in integrating the HIV/AIDS Programme's budget in the Directorate-General of Health, which resulted in successive delays in paying suppliers and acquiring preventive materials (male and female condoms). The implementation in all public hospitals of the new electronic information system to follow-up HIV patients also suffered significant delays. Finally, by the end of 2012, the National Association of Pharmacies decided to terminate the agreement in the context of the Syringe Exchange Programme, with effect from 1 January 2013 [17].

2.2.4. Outcomes of the reform

Portugal has had a significant decline in new HIV and AIDS diagnoses in the past decade (Fig. 2.2.1). Decrease in new HIV diagnosis was more significant in persons infected by heterosexual transmission, people who inject drugs (PWID) and mother-to-child transmission (MTCT), while new HIV diagnoses in men who have sex with men (MSM) show a stable trend [1]. AIDS-related deaths have also steadily decreased in the past 10 years in Portugal (Fig. 2.1.1). Since 2011, the annual number of deaths in people infected heterosexually is higher than in PWID [1].

For the period 2009-2018, we reviewed the outcomes of core HIV prevention programmes managed by the National Programme for HIV/AIDS Infection: financial support to private non-for-profit organisations, the syringe exchange programme, HIV rapid testing, and the distribution of preventive materials. These programmes correspond to the main attributions of the National Programme for HIV/AIDS Infection.



Source: DGS/INSA (as of 31 Dec 2018)

Figure 2.2.1. Number of new HIV and AIDS cases, and AIDS-related deaths, Portugal, 2009-2017.

2.2.4.1. New rules for financial support to private non-for-profit organisations

In 2002, the ADIS/SIDA Programme (*Apoio Desenvolvimento Intervenção SIDA*) established the rules for the financial support from the National Commission for the Fight Against AIDS to projects and actions carried out by civil society organizations dedicated to the response to HIV/AIDS in Portugal. In 2006, the Portuguese Government approved legislation to regulate the allocation of funding to private non-for-profit organizations [18]. Following the new legislation, in 2009 the amount dedicated to the ADIS Programme was EUR 9.5 million for a 4-year period: EUR 8.4 million to pluriannual projects funded in 2008 and 2009, and EUR 1.1 million to fund new projects to be implemented from 2010 onwards [19,20]. In 2010, the total amount dedicated to the ADIS Programme was EUR 4.0 million, and the National Coordination for HIV/AIDS Infection assigned EUR 2.4 million to new projects to be implemented in 2011 [21,22]. Finally, in

2. RESULTS

2011, the amount dedicated to the ADIS Programme was EUR 9.0 million for a 4-year period [23]. This was the final year of both the ADIS programme and the National Coordination for HIV/AIDS Infection.

Financial support to private non-for-profit organisations by the Ministry of Health was newly regulated in 2013, and the Integrated System for Health Financial Support Programmes (*Sistema Integrado de Programas de Apoio Financeiro em Saúde*, SIPAF) was created [24]. By the end of 2013, organisations were able to request funding for their projects according to the new rules. The amount dedicated by the Portuguese Government for that purpose was EUR 1 million, which was to be spent in 2014 (exclusively for HIV/AIDS projects) [25]. For 2015, the government established an amount of EUR 2.3 million for pluriannual programmes (2 years) and EUR 75,000 for specific programmes to fund projects in the framework of the National Health Plan and all Priority Health Programmes (including the HIV/AIDS Programme) [26]. For 2016, EUR 2 million were dedicated to fund HIV/AIDS projects [27], and, for 2017, the Portuguese Government allocated EUR 2.8 million to fund projects on HIV/AIDS, diabetes, mental health and healthy nutrition, for the period of one year [28].

Under the new funding rules, the National Programme for HIV/AIDS Infection targeted the expansion of HIV testing as a strategic priority, funding non-governmental and community-based organisations (NGOs/CBOs) across the country to provide HIV testing services. Besides retaining funding for previously approved projects under the ADIS Programme, funding for new projects was available, although the annual expenditure with financial support to NGOs/CBOs was initially for a shorter period than before. More recently, in 2018, the Portuguese Government allocated EUR 3.7 million to fund projects carried out by private non-for-profit organisations during a 2 year-period [29].

2.2.4.2. Reduction of costs with the Syringe Exchange Programme

Pharmacies have been key partners in the network of harm reduction services provided to PWID. The Portuguese Syringe Exchange Programme (SEP) was established in October 1993 as a partnership between the Ministry of Health and the National Association of Pharmacies (*Associação Nacional das Farmácias*), with the collaboration of wholesalers and municipalities. Pharmacies distribute free kits, containing two sterile

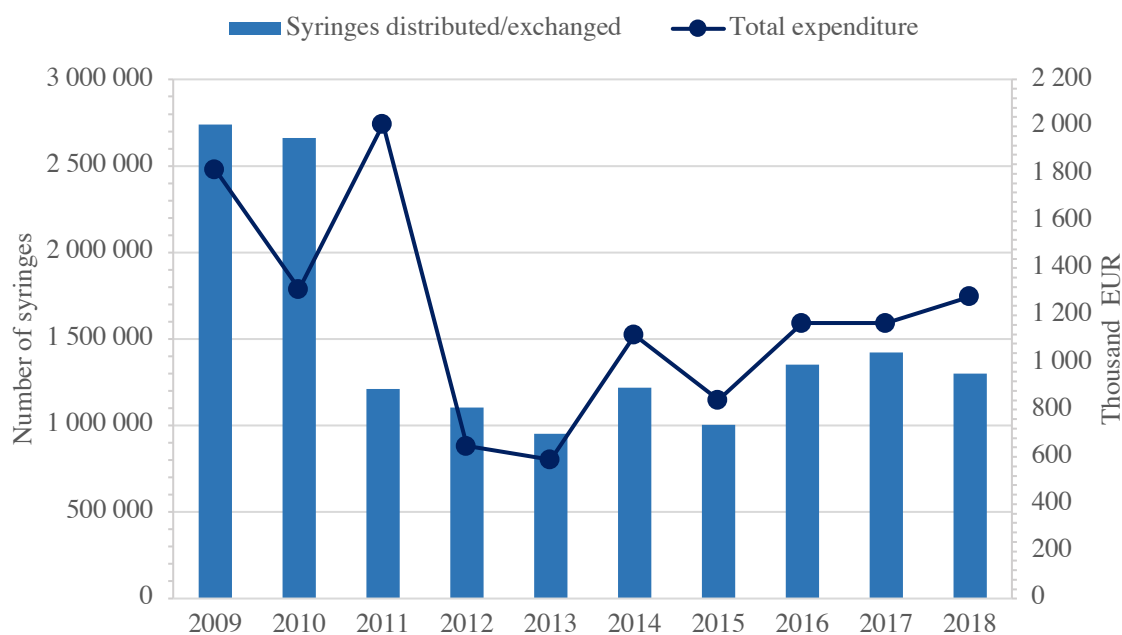
syringes and needles, two swabs, two filters, two ampoules of distilled water, two recipients for the preparation of drugs, two citric acid sachets, and one condom [30]. The participation by pharmacies is voluntary and no fee-for-service is charged. The National Programme for HIV/AIDS Infection funds the production and distribution of injecting equipment, as well as the collection and destruction of sharp waste generated. Between 1993 and 2017, over 56 million syringes were distributed.

The SEP was operated exclusively in community pharmacies between 1993 and 1998, but after 1999, NGOs/CBOs also began participating in the distribution and collection of kits. Since 2009, the number of syringes collected or exchanged at community pharmacies has been decreasing, as NGOs/CBOs became the main drivers of distribution. Between 2009 and 2012, the number of syringes distributed decreased by 60% (**Fig. 2.2.2**). This was due to a change in the drug use pattern, with a gradual reduction in injecting drug use.

When the agreement with the National Association of Pharmacies was cancelled in 2012, SEP was transferred to Public Health Units, at Primary Health Care [31]. Additionally, NGOs/CBOs would operate the distribution of kits in the streets, including night schedules. In 2013 the number of syringes collected or exchanged decreased by 14% (**Figure 2.2.2**), and only 3% of the syringes were collected/exchanged at Public Health Units. In July 2014, a new agreement between the Ministry of Health and the National Association of Pharmacies was signed, and since January 2015 the SEP has been implemented again at community pharmacies. As a result, since 2015, there has been an upward trend in the number of syringe kits distributed (**Figure 2.2.2**).

In terms of SEP costs, there was a reduction by 68% between 2011 and 2012, but that trend was reversed in 2014 (**Figure 2.2.2**). Overall, between 2009 and 2018, SEP costs were reduced by 30%. This development is explained by the centralisation of purchase of SEP kits. In fact, the purchase of SEP kits meets the programme needs for long periods and explains the variations in annual total expenditure. However, in contrast to what was observed in Greece [32], the number of new HIV cases in PWID in Portugal continued to decrease steadily between 2009 and 2017.

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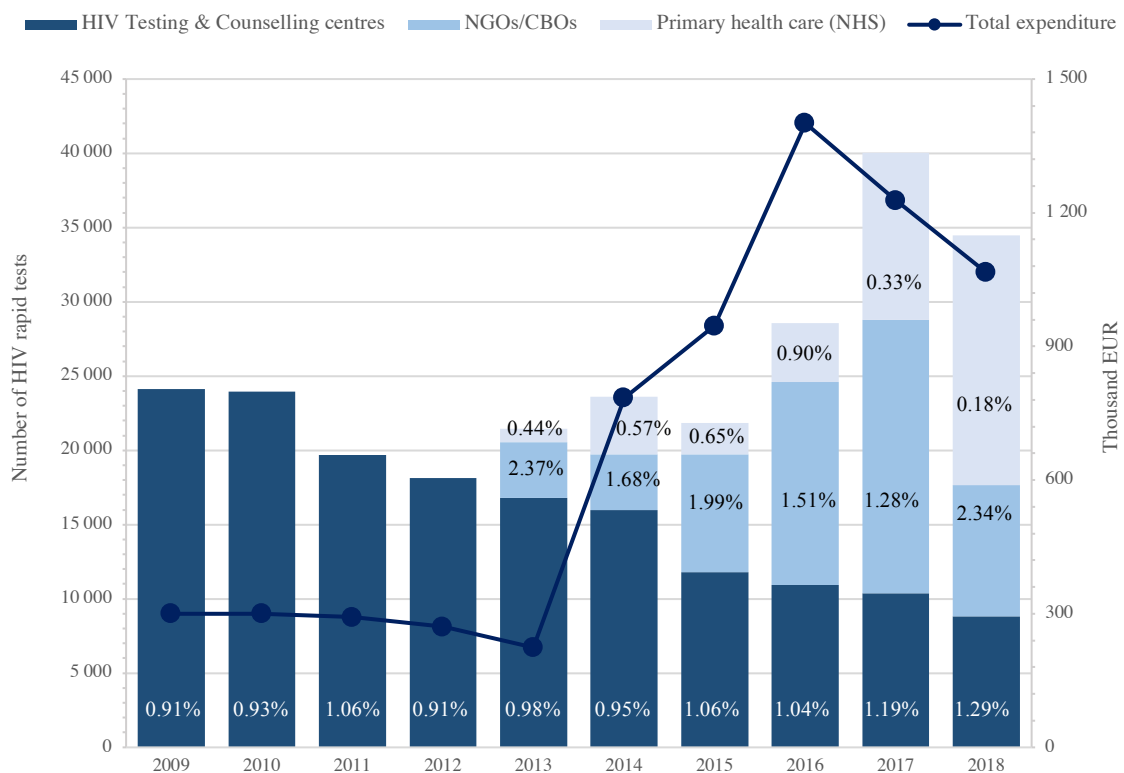


Source: National Programme for HIV/AIDS Infection/DGS

Figure 2.2.2. Number of syringes distributed/exchanged and total expenditure, 2009-2018.

2.2.4.3. Greater investment in community-based HIV testing

Typically, rapid HIV testing was provided by the Portuguese National Health Service at HIV Testing and Counselling Centres (CAD, *Centros de Aconselhamento e Detecção*). There were 20 active HIV Testing and Counselling Centres in 2006, but two of them were shut down in 2007, and one more closed its doors in 2012. This happened because of low demand as new community responses became available. HIV testing services were gradually offered by proximity structures operated by NGOs/CBOs, as these structures were effective in reaching most-at-risk populations, particularly key populations in the large urban areas of Lisbon and Oporto. Co-funded by the National Coordination for HIV Infection, the first community testing centre targeting men who have sex with men opened its doors in Lisbon in 2011. In the following years, changes in prioritisation of funding by the National Programme for HIV/AIDS Infection and the organisation of a national network of testing projects operated by NGOs/CBOs, made it possible to expand not only anonymous and free HIV testing, but also testing for hepatitis B and C, and syphilis.



Source: National Programme for HIV/AIDS Infection/DGS

Notes:

- 1) Total expenditure includes rapid testing for hepatitis B, hepatitis C and syphilis provided by NGOs/CBOs, according to their Terms of Reference.
- 2) Reactivity rates express the rate of HIV rapid tests whose result was reactive for HIV antibodies; a confirmatory test is needed to verify a reactive result and diagnose HIV infection.
- 3) HIV tests prescribed by doctors in primary health care or hospital settings are not included here, as these tests are not funded by the National Programme for HIV/AIDS Infection.

Figure 2.2.3. Number of HIV rapid tests by type of service (with respective reactivity rates), and total expenditure, 2009-2018.

From 2013 onwards, the role of NGOs/CBOs and primary health care units in providing HIV rapid testing became more evident. Thus, the number of HIV tests at HIV Testing and Counselling Centres therefore decreased steadily, while the number of HIV tests at NGOs/CBOs since 2014 have been registering a remarkable increase, exceeding those performed at HIV Testing and Counselling Centres in 2016 and 2017 (**Figure 2.2.3**). Since 2018, one important civil society organisation based in Lisbon started to be funded

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by the Regional Health Administration and not by the HIV Programme, which is why the number of HIV tests in NGOs/CBOs funded by the Programme has decreased (**Figure 2.2.3**). The number of HIV tests in primary health care was initially residual, but between 2016 and 2018 the number of HIV tests has had a 4-fold increase (**Figure 2.2.3**). The number of HIV rapid tests in all settings increased by 61% between 2013 and 2018, reaching 34,458 in 2018.

After a period (2009-2013) with little variation in expenditure, total expenditure on HIV rapid testing has shown a remarkable increase after 2013, as the HIV Programme started funding rapid HIV testing in other settings such as NGOs/CBOs and primary healthcare units (**Figure 2.2.3**). It is important to note that the total expenditure on HIV rapid tests is in part related to acquiring and distributing the testing kits, which can be used according to the demand in each setting and taking into account their expiration date.

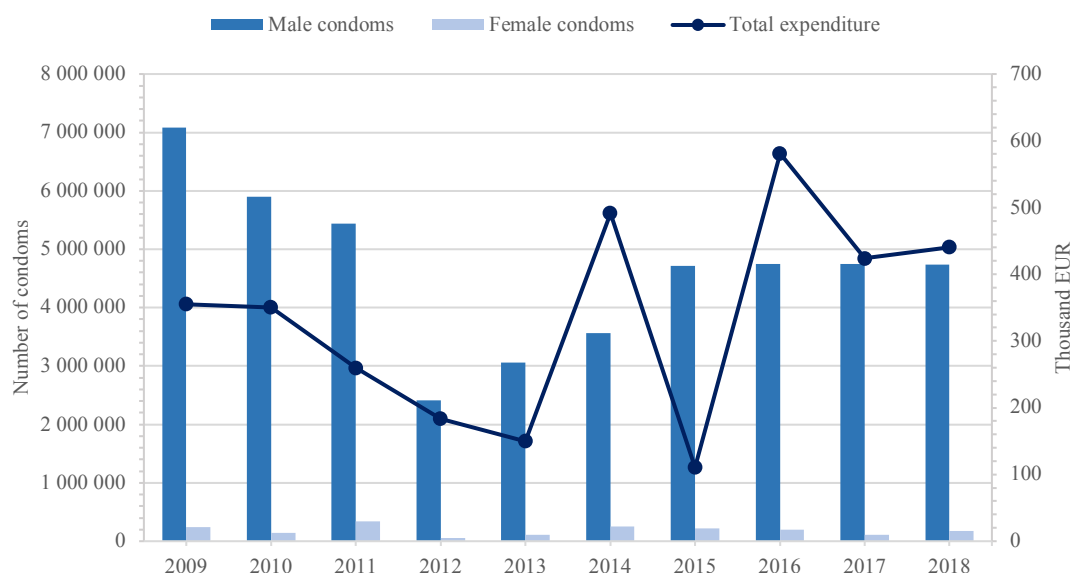
Reactivity rates had a great variation according to the testing setting (**Figure 2.2.3**): NGOs/CBOs have the highest reactivity rates due to their proximity services targeted to most-at-risk key populations, which those organisations are more effective reaching.

2.2.4.4. Increased spending in preventive materials

The National Programme for HIV/AIDS Infection is responsible for the acquisition of preventive materials to be distributed within the Portuguese National Health Service, both in HIV Testing and Counselling Centres and in primary health care. It is also responsible for acquiring preventive materials to be distributed by NGOs/CBOs working on HIV prevention. Preventive materials include male and female condoms, and also lubricant.

The number of male condoms distributed declined dramatically between 2009 and 2012, registering a steady increase ever since this period, while the number of female condoms shows a decreasing trend since 2014 (**Figure 2.2.4**). Data shows a 24% increase in expenditure on preventive materials from 2009 to 2018. The variations in total expenditure during the 10-year period are explained by the centralisation of purchase and the validity of preventive materials. Thus, peaks in expenditure correspond to the acquisition of a very large amount of preventive materials for distribution during the subsequent months, based on demand and needs (**Figure 2.2.4**).

Despite being currently in smaller number than in the beginning of the selected period, the decrease in the number condoms distributed does not seem to have impacted the country's HIV epidemic, at least for those who are infected heterosexually.



Source: National Programme for HIV/AIDS Infection/DGS

Note: Besides male and female condoms, total expenditure includes lubricant.

Figure 2.2.4. Number of male and female condoms distributed and total cost on preventive materials, 2009-2018.

2.2.5. Discussion

The reforms of Portugal's vertical programmes, including the HIV/AIDS Programme, have been a challenging process that occurred during a difficult financial and economical context in the country. This reform was an organisational response from the Ministry of Health as a consequence to the extinction of the High Commissariat for Health. This event, that was coincident with the new National Health Plan (2012-2016), was an opportunity to organise priority health programmes targeting particular risk factors and diseases in the population. The reform of the HIV/AIDS Programme also followed the international shift towards strengthening the integration of HIV response in national health systems.

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The HIV/AIDS Programme reform must be analysed from two different perspectives. One is the move towards an integration of HIV response in other settings of the Portuguese National Health Service. HIV Counselling and Testing Centres are no longer the main providers of rapid HIV testing to the population, as rapid testing became widely available in primary care units and NGOs/CBOs, through HIV/AIDS Programme funding. The distribution of preventive materials and syringe kits have for a long time been assured by structures closer to the community such as NGOs/CBOs and pharmacies. The other perspective is the economic and financial crisis that affected Portugal. After the reform, the new National Programme for HIV/AIDS Infection operated with less financial and human resources than its predecessor.

Although the main purpose of the reform was to resize the programme and introduce organisational changes to make it more efficient, transitory financial constraints in 2012 and 2013 imposed important difficulties in running the Programme's main activities. Nevertheless, in general terms, the National Programme for HIV/AIDS Infection was able to improve its efficiency and sustain its core activities. Since the reform was implemented, Portugal was able to reduce new HIV infections by 35%, new AIDS cases by 60% and AIDS-related deaths by 50%.

The most important feature of this reform was the definition of clear prioritisation of resources. Since the HIV/AIDS Programme has less resources than its predecessor, resources were prioritised for the expansion of HIV testing. That was made possible through strategic partnerships with NGOs/CBOs, which are more effective in reaching the most-at-risk populations. Other studies confirm that prioritising screening in higher-risk populations and geographic settings is cost-effective [33].

Despite the initial difficulties faced by the new National Programme for HIV/AIDS Infection, new HIV diagnosis continued to decline as HIV testing was being expanded. It is important to note that access to antiretroviral therapy (ART) for people living with HIV is free in Portugal and it is an important factor contributing to halt the epidemics. Although the National Programme for HIV/AIDS Infection does not manage the provision of ART, it played an important role for the adoption, in 2015, of WHO's new recommendations on HIV treatment: treat all, meaning that everyone tested positive for HIV should be linked to ART irrespective of their clinical condition [34].

Finally, the reform of the Portuguese HIV/AIDS Programme can also be placed in the context of the European response to HIV. Some authors argue that the economic crisis of 2008 forced a shift from a human rights approach to HIV/AIDS to an increased focus on containment, efficiency, and cost reduction [35]. However, despite the economic crisis, Portugal's response to HIV has kept an emphasis on human rights, including the reduction of stigma and discrimination, as well as assuring all PLHIV timely access HIV care.

2.2.6. Conclusion

The National Programme for HIV/AIDS Infection has identified core challenges for the near future, namely to expand access to pre-exposure prophylaxis (PrEP) to individuals most at risk of HIV infection; to improve electronic information systems for better information; to improve access and enhance adherence to antiretroviral therapy; to evaluate and possibly expand dispensation of antiretroviral therapy in community pharmacies (being piloted since 2017); and to decrease late diagnosis by continuing to promote access to quality HIV testing services – including rapid tests for HIV, and hepatitis B and C in community pharmacies – and by making HIV self-testing available in community pharmacies [36], which happened in October 2019 [37].

Portugal has successfully reduced the number of new HIV infections in the past decade, while the country was struggling with a severe economic crisis. The reform of the HIV/AIDS Programme promoted efficiency and important partnerships with NGOs/CBOs, which were crucial to keep the country's response towards HIV during those difficult times. In this sense, results from this analysis are important to illustrate how health reforms can be successfully implemented during difficult economic contexts. Adopting and expanding innovative preventive tools, expanding HIV testing, and improving access and adherence to HIV care will be pivotal actions to accelerate the reduction of HIV epidemics in the country. Keeping ties with civil society organizations seems to be a smart option to prioritise resources.

2. RESULTS

2.2.7. References

1. National Institute of Health Dr Ricardo Jorge. *Infeção VIH e SIDA: a situação em I. National Institute of Health Dr Ricardo Jorge. Infeção VIH e SIDA em Portugal – 2019 [HIV Infection and AIDS in Portugal – 2019]*. Lisbon: INSA; 2019. <http://www.insa.min-saude.pt/wp-content/uploads/2019/11/RelatVIHSIDA2019.pdf>. Accessed 10 December 2019.
2. European Centre for Disease Prevention and Control, WHO Regional Office for Europe. *HIV/AIDS surveillance in Europe 2019 – 2018 data*. Copenhagen: WHO Regional Office for Europe; 2019. <https://www.ecdc.europa.eu/sites/default/files/documents/HIV-annual-surveillance-report-2019.pdf>. Accessed 10 December 2019.
3. Aviso [Notice], Secretary-General of the Ministry of Health. *Diário da República [Government Gazette]* No. 241, Serie II. 19 October 1985.
4. Despacho No. 5/90 [Dispatch No. 5/90], Ministry of Health, of 3 April 1990. *Diário da República [Government Gazette]* No. 78, Serie II. 3 April 1990.
5. Decreto-Regulamentar No. 7/2005 [Regulatory-Decree No. 7/2005], of 10 August 2005. *Diário da República [Government Gazette]* No. 153, Serie I-B. 10 August 2005. <https://dre.pt/application/conteudo/241792>. Accessed 21 January 2019.
6. Despacho No. 19871/2005 [Dispatch No. 19871/2005], Minister of Health, of 15 September 2005. *Diário da República [Government Gazette]* No. 158, Serie II. 15 September 2005. <https://dre.pt/application/conteudo/2577223>. Accessed 21 January 2019.
7. Decreto-Lei No. 218/2007 [Decree-Law No. 218/2007], of 29 May 2007. *Diário da República [Government Gazette]* No. 103, Serie I. 29 May 2007. <https://dre.pt/application/conteudo/638528>. Accessed 21 January 2019.
8. Portaria No. 258/2005 [Ordinance No. 258/2005], of 16 March 2005. *Diário da República [Government Gazette]* No. 53, Série I-B. 16 March 2005. <https://dre.pt/application/conteudo/572670>. Accessed 21 January 2019.

9. Decreto-Lei No. 124/2011 [Decree-Law no. 124/2011], of 29 December 2011. *Diário da República [Government Gazette]* No. 249, Serie I. 29 December 2011. <https://dre.pt/application/conteudo/145186>. Accessed 21 January 2019.
10. Augusto GF. Cuts in Portugal's NHS could compromise care. *Lancet*. 2012; 379(9814):400. DOI: [http://doi.org/10.1016/s0140-6736\(12\)60174-3](http://doi.org/10.1016/s0140-6736(12)60174-3)
11. Barros PP. Health policy reform in tough times: the case of Portugal. *Health Policy*. 2012; 106(1):17-22. DOI: <http://doi.org/10.1016/j.healthpol.2012.04.008>
12. Perelman J, Felix S, Santana R. The Great Recession in Portugal: impact on hospital care use. *Health Policy*. 2015; 119(3):307-15. DOI: <http://doi.org/10.1016/j.healthpol.2014.12.015>
13. Despacho No. 404/2012 [Dispatch no. 404/2012], of 13 January 2012. *Diário da República [Government Gazette]* No. 10, Serie II. 13 January 2012. <https://dre.pt/application/conteudo/2150516>. Accessed 21 January 2019.
14. Simões J, Augusto GF, Fronteira I, Hernandez-Quevedo C. Portugal: Health System Review. *Health Syst Transit*. 2017; 19(2): 1-184. http://www.euro.who.int/_data/assets/pdf_file/0007/337471/HiT-Portugal.pdf?ua=1. Accessed 21 January 2019.
15. Directorate-General of Health/National Programme for HIV/AIDS Infection. *National Programme for Prevention and Control of HIV/AIDS Infection*. <http://www.pnvihsida.dgs.pt/programa-nacional1111111111.aspx>. Accessed 21 January 2019.
16. World Health Organization. *Adapting WHO normative HIV guidelines for national programmes: essential principles and processes*. Geneva: WHO; 2011. https://apps.who.int/iris/bitstream/handle/10665/44629/9789241501828_eng.pdf;jsessionid=342CCEBC3B03221AC0232038BFF62BB7?sequence=1. Accessed 10 December 2019.

2. RESULTS

17. Directorate-General of Health/National Programme for HIV/AIDS Infection. *Relatório Anual de Atividades 2012 [Annual Activity Report 2012]*. <http://www.pnvihsida.dgs.pt/programa-nacional1111111111/relatorios-de-atividades11/relatorio-de-atividades-2012.aspx>. Accessed 21 January 2019.
18. Decreto-Lei No. 186/2006 [Decree-Law no. 186/2006], of 12 September 2006. *Diário da República [Government Gazette]* N.º 176, Serie I. 12 September 2006. <https://dre.pt/application/conteudo/540026>. Accessed 21 January 2019.
19. Despacho No. 11447/2009 [Dispatch no. 11447/2009], of 12 May 2009. *Diário da República [Government Gazette]* No. 91, Serie II. 12 May 2009. <https://dre.pt/application/conteudo/1285027>. Accessed 21 January 2019.
20. National Coordination for HIV/AIDS Infection. *Atividades 2009 [Activity Report 2009]*. <http://www.pnvihsida.dgs.pt/programa-nacional1111111111/relatorios-de-atividades11/relatorio-atividades-2009.aspx>. Accessed 21 January 2019.
21. Despacho No. 8035/2010 [Dispatch no. 8035/2010], of 7 May 2010. *Diário da República [Government Gazette]* No. 89, Serie II. 7 May 2010. <https://dre.pt/application/conteudo/2643503>. Accessed 21 January 2019.
22. National Coordination for HIV/AIDS Infection. *Atividades 2010 [Activity Report 2010]*. <http://www.pnvihsida.dgs.pt/programa-nacional1111111111/relatorios-de-atividades11/relatorio-de-atividades-2010.aspx>. Accessed 21 January 2019.
23. Despacho No.7535/2011 [Dispatch no. 7535/2011], of 23 May 2011. *Diário da República [Government Gazette]* No. 99, Serie II. 23 May 2011. <https://dre.pt/application/conteudo/2086543>. Accessed 21 January 2019.
24. Portaria No. 258/2013 [Ordinance No. 258/2013], of 13 August 2013. *Diário da República [Government Gazette]* No. 155, Serie I. 13 August 2013. <https://dre.pt/application/conteudo/499214>. Accessed 21 January 2019.
25. Despacho No.16618/2013 [Dispatch no. 16618/2013], of 23 December 2013. *Diário da República [Government Gazette]* No. 248, Serie II. 23 December 2013. <https://dre.pt/application/conteudo/1202978>. Accessed 21 January 2019.

26. Despacho No.15522/2014 [Dispatch no. 15522/2014], of 23 December 2014. *Diário da República [Government Gazette]* No. 247, Serie II. 23 December 2014. <https://dre.pt/application/conteudo/65982041>. Accessed 21 January 2019.
27. Despacho No.115/2016 [Dispatch no. 115/2016], of 6 January 2016. *Diário da República [Government Gazette]* No. 3, Serie II. 6 January 2016. <https://dre.pt/application/conteudo/73013525>. Accessed 21 January 2019.
28. Despacho No.15067/2016 [Dispatch no. 15067/2016], of 14 December 2016. *Diário da República [Government Gazette]* No. 238, Serie II. 14 December 2016. <https://dre.pt/application/conteudo/105362843>. Accessed 21 January 2019.
29. Portaria No. 256/2018 [Ordinance no. 256/2018], of 3 May 2018. *Diário da República [Government Gazette]* No. 85, Serie II. 3 May 2018. <https://dre.pt/application/conteudo/115209806>. Accessed 21 January 2019.
30. Torre C, Lucas R, Barros H. Syringe exchange in community pharmacies – The Portuguese experience. *Int J Drug Policy*. 2010;21(6):514-7. DOI: <http://doi.org/10.1016/j.drugpo.2010.09.001>
31. Directorate-General of Health. *Relatório de Atividades 2013 [Activity Report 2013]*. <https://www.dgs.pt/a-direccao-geral-da-saude/instrumentos-de-gestao/ficheiros-externos/relatorio-de-atividades-2013-pdf.aspx>. Accessed 21 January 2019.
32. Paraskevis D, Nikolopoulos G, Fotiou A, Tsiara C, Paraskeva D, Sypsa V, Hatzakis A. Economic recession and emergence of an HIV-1 outbreak among drug injectors in Athens metropolitan area: A longitudinal study. *i*. 2013; 8(11):e78941. DOI: <http://doi.org/10.1371/journal.pone.0078941>
33. Yazdanpanah Y, Perelman J, DiLorenzo MA, et al. Routine HIV screening in Portugal: clinical impact and cost-effectiveness. *PLoS One*. 2013;8(12):e84173. DOI: <http://doi.org/10.1371/journal.pone.0084173>
34. Directorate-General of Health. *Recomendações Portuguesas para o tratamento da infeção por VIH-1 e VIH- 2 (Versão 1.0) [Portuguese Guidelines for Treatment of HIV-1 and HIV-2 Infection (Version 1.0)]*; 2015.

2. RESULTS

<https://www.pnvihsida.dgs.pt/informacao-tecnica-e-cientifica111/recomendacoes-nacionais/-recomendacoes-portuguesas-para-o-tratamento-da-infecao-por-vih-1-e-vih-2-2015-pdf.aspx>

35. Smith J. Europe's Shifting Response to HIV/AIDS: From Human Rights to Risk Management. *Health Hum Rights*. 2016;18(2):145–156.
36. Directorate-General of Health/National Programme for HIV/AIDS Infection. *Infeção VIH e SIDA – Desafios e Estratégias 2018 [HIV Infection and AIDS – Challenges and Strategies 2018]*. Lisbon: DGS; 2018. <https://www.dgs.pt/documentos-e-publicacoes/infecao-vih-e-sida-desafios-e-estrategias-2018.aspx>. Accessed 21 January 2019.
37. Augusto GF. HIV self-testing kits enjoy successful launch in Portugal. *Lancet Infect Dis*. 2019;19(12):1289. DOI: [http://doi.org/10.1016/S1473-3099\(19\)30643-7](http://doi.org/10.1016/S1473-3099(19)30643-7)

2.3. Trends in HIV surveillance data in Portugal, 2005-2017: patterns observed among native and foreign-born cases

2.3.1. Introduction

Human immunodeficiency virus (HIV) transmission remains a significant public health challenge in Europe, affecting more than 2 million people [1,2]. With a rate of 12.7 cases per 100,000 population in 2016, Portugal was among the countries in the European Union and European Economic Area (EU/EEA) with the highest incidence rate of HIV, following Latvia (18.5), Estonia (17.4) and Malta (14.5) [2].

Portugal has a concentrated HIV epidemic with specific characteristics, given its historical and cultural bounds with Sub-Saharan Africa and Brazil [3]. After reaching a peak in 1999, when the epidemic was mainly driven by cases among people who inject drugs (PWID), the number of both new HIV and AIDS diagnoses in Portugal has been decreasing steadily. Heterosexual contacts are the most frequent mode of HIV transmission identified among all cases diagnosed during last decade; however, sex between men recently exceeded heterosexual transmission amongst male cases [4].

The aim of our study was to analyse Portuguese HIV/AIDS surveillance data for the years 2005 to 2017, in order to better understand transmission patterns and identify key populations for whom prevention efforts can be intensified.

2.3.2. Methods

2.3.2.1. Data source

We used data from the national HIV and acquired immunodeficiency syndrome (AIDS) registry database, collected as part of HIV/AIDS surveillance in Portugal. A dedicated surveillance system was set up in 1985 on a clinician voluntary case report basis; in 2005, HIV/AIDS became a mandatory communicable disease [5]. Since 2015, mandatory notification of transmissible diseases, including HIV/AIDS, is done exclusively by an electronic platform [6]. The national registry database of all HIV and AIDS cases reported in Portugal is maintained by the National Institute of Health (INSA, *Instituto Nacional de Saúde Doutor Ricardo Jorge*), which is the national reference laboratory of the Ministry of Health.

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We included all new HIV and AIDS cases diagnosed between 1 January 2005 and 31 December 2017, notified until 31 December 2018. Data was anonymised and variables extracted were the following: year of diagnosis (HIV infection and AIDS), gender, age at diagnosis (age-group), country of birth, mode of transmission, country of probable acquisition of HIV infection, stage at diagnosis and CD4 count at first evaluation.

2.3.2.2. Definitions

For this analysis we defined foreign-born cases as cases born outside Portugal, irrespective of their nationality, while native-born cases were defined as cases born in Portugal. A late HIV diagnosis was defined as having a CD4⁺ T-cell count below 350 cells/mm³ at HIV diagnosis [7].

2.3.2.3. Statistical analysis

Descriptive analysis were conducted on trends in new HIV and AIDS diagnoses, and late HIV diagnoses. Linear regression models were used to test for trends, whereby the significance level was set at 0.05. Overall proportions of new HIV diagnoses according to age group, route of transmission and probable place of acquisition of HIV infection were also calculated. Statistical significance for differences between proportions was tested at a significance of 0.05. All statistical analyses were conducted using SPSS 25.0.

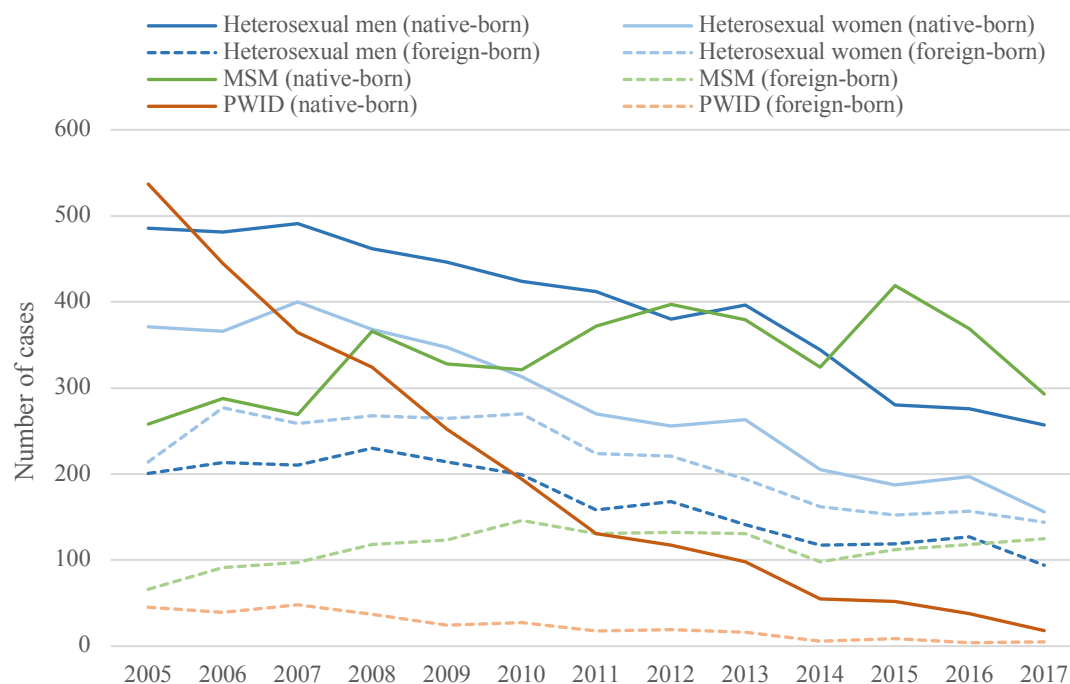
2.3.3. Results

Between 2005 and 2017, 23,468 people were newly diagnosed with HIV infection in Portugal. The majority of cases (69.0%) were men and most (29.7%) were 30-39 years old. A total of 14,007 cases (59.7%) were attributed to heterosexual contact, 5,932 (25.3%) to men who have sex with men (MSM), 2,955 (12.6%) to injecting drug use, and 185 (0.8%) to other routes of transmission. The transmission mode was not reported or unknown in 389 cases (1.7%). Between 2005 and 2017, 29.7% (n=6,972) of newly diagnosed HIV cases in Portugal were foreign-born; the place of birth was not recorded in 1.2% (n=290) of cases. The five top foreign countries of birth by absolute numbers

were all Portuguese speaking countries: Guinea-Bissau (n=1,627), Brazil (n=1,499), Angola (n=1,175), Cape Verde (n=889), and Mozambique (n=490).

2.3.3.1. Trends in new HIV diagnoses in Portugal, 2005-2017

Between 2005 and 2017, the number of new HIV diagnoses attributed to heterosexual transmission and injecting drug use decreased significantly both in foreign and native-born people (p value for trend < 0.001 in all groups), while the number of diagnoses in MSM shows a non-significant increasing trend, both in native and foreign cases (p value for trend 0.06 and 0.09, respectively) (**Figure 2.3.1**). Unlike native-born cases, the number of new HIV infections is systematically higher among foreign-born women with heterosexual transmission when comparing to foreign-born heterosexual males. In heterosexual native-born cases, male-to-female ratio was 1.4, while in heterosexual foreign-born cases was 0.8.



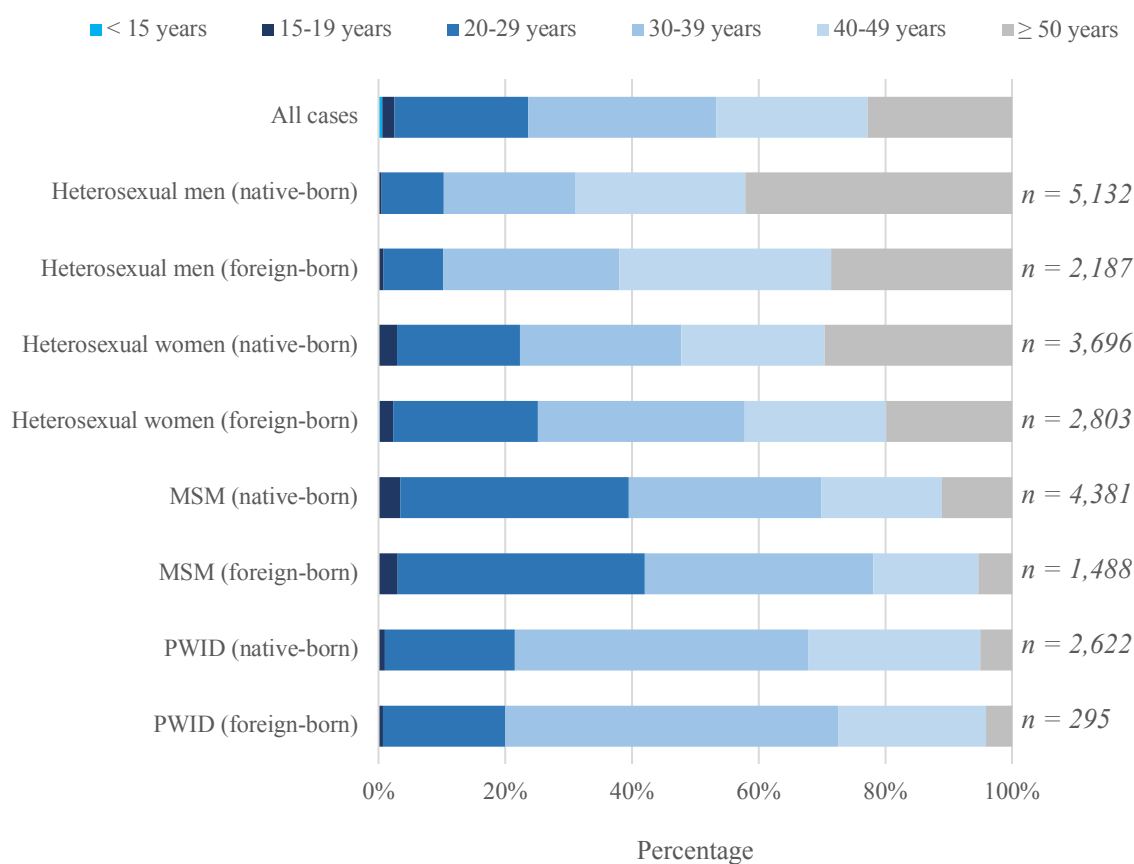
Source: DGS/INSA

Note: Cases with unknown place of birth, unknown route of transmission and other routes of transmission were excluded from data presented here.

Figure 2.3.1. Number of new HIV diagnoses with known route of transmission, by place of birth and main route of transmission, Portugal, 2005-2017 (n = 22,625).

2. RESULTS

Age was reported in 23,439 cases, of which 22.8% were 50 years or older. While most foreign-born men infected heterosexually were 40-49 years old (33.4%), most native-born men infected by heterosexual route were 50 years or older (42.0%), a proportion significantly higher than in any other group ($p < 0.001$) (**Figure 2.3.2**). In women infected heterosexually, most foreign-born were 30-39 years old (32.6%) and most native-born were 50 years or older (29.6%). In MSM, most native and foreign-born cases were 20-29 years old (39.0% and 36.1%, respectively), while in PWID were aged 30-39 years old (46.3% and 52.5%, respectively) (**Figure 2.3.2**).



Source: DGS/INSA

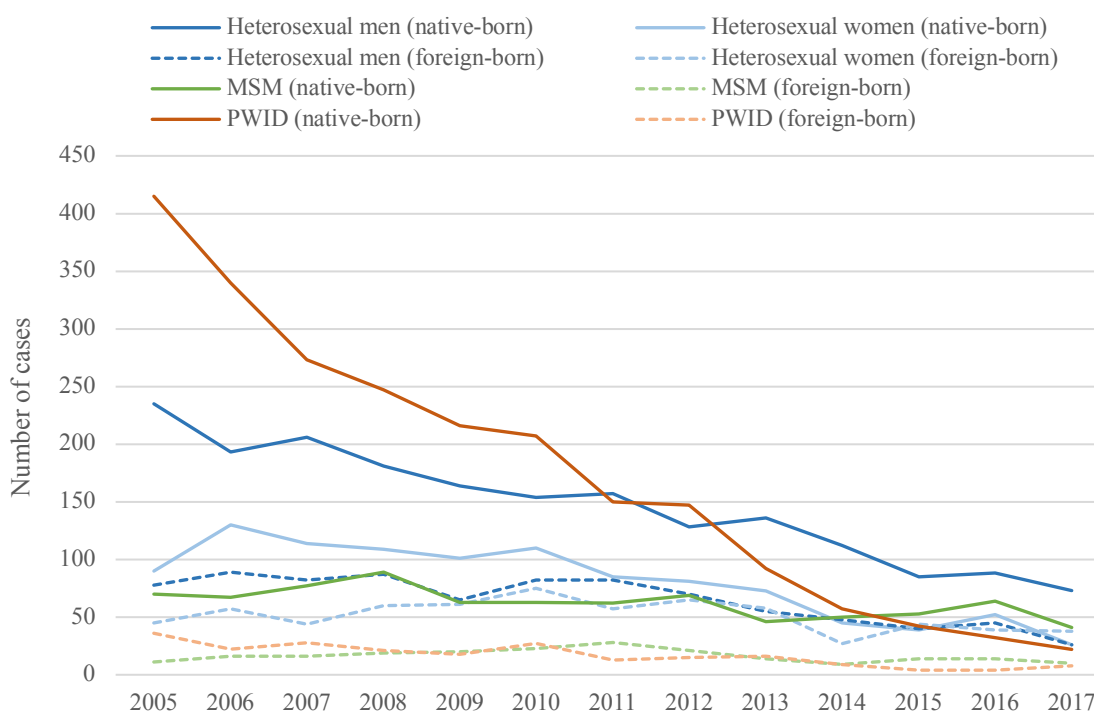
Note: The category “All cases” includes 22,604 cases for whom place of birth and route of transmission was known and an additional 835 cases for whom place of birth was unknown and/or route of transmission was unknown or corresponded to other routes of transmission.

Figure 2.3.2. Proportion of new HIV diagnoses by age group at diagnosis, by place of birth and main route of transmission, Portugal, 2005-2017 (n = 23,439).

2.3.3.2. Trends in AIDS diagnoses in Portugal, 2005-2017

Between 2005 and 2017, 8,071 people were diagnosed AIDS in Portugal. A total of 4,454 cases (55.2%) were attributed to heterosexual contact, 4,440 (30.2%) to injecting drug use, 1,009 (12.5%) to MSM, and 44 (0.5%) to other routes of transmission. The transmission mode was not reported or unknown in 124 cases (1.5%).

During the study period, 24.3% (n=1,959) of new AIDS cases diagnosed in Portugal were foreign-born, while 74.9% (n=6,047) were born in Portugal. The place of birth was not recorded in 0.8% of cases. The number of AIDS cases has significantly decreased in all transmission groups (p value for trend < 0.001), except in foreign-born women infected by heterosexual route and foreign-born MSM (p value for trend 0.175 and 0.381, respectively) (**Figure 2.3.3**). In native-born cases with heterosexual route of transmission, male-to-female ratio was 1.8, while in foreign-born cases was 1.3.



Source: DGS/INSA

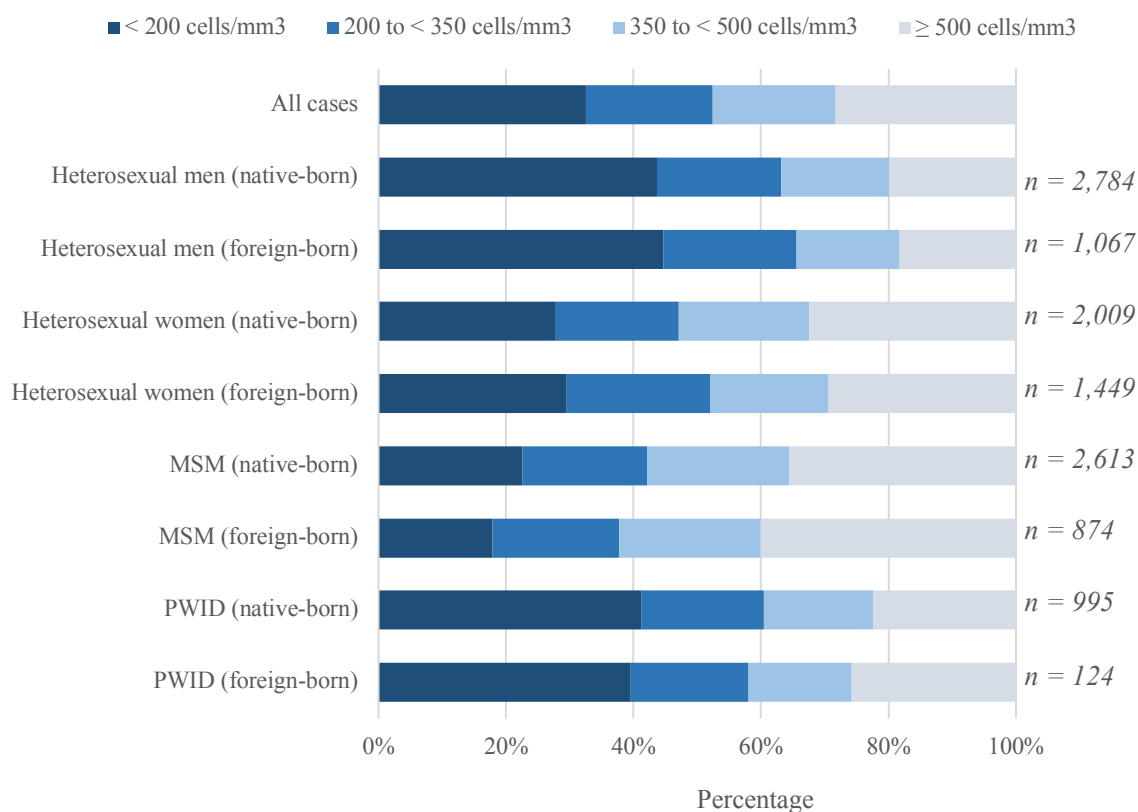
Note: Cases with unknown place of birth, unknown route of transmission and other routes of transmission were excluded from data presented here.

Figure 2.3.3. Number of AIDS diagnoses, by place of birth and main route of transmission, Portugal, 2005-2017 (n = 7,976).

2. RESULTS

2.3.3.3. Late diagnosis in Portugal, 2005-2017

Between 2005 and 2017, information on CD4⁺ T-cell count/mm³ at HIV diagnosis was reported on 12,336 (52.6%) cases. Of these, 6,467 individuals (52.4%) had a CD4⁺ T-cell count at diagnosis lower than 350 cells/mm³, including 4,016 cases (32.6%) with a CD4⁺ T-cell count lower than 200 cells/mm³ (**Figure 2.3.4**).



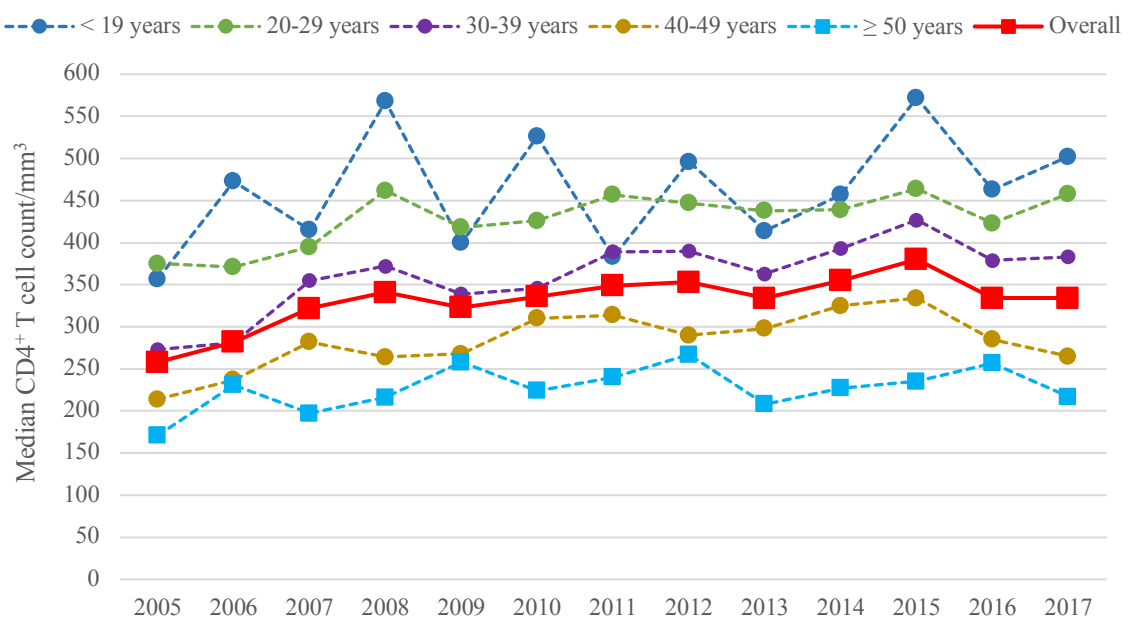
Source: DGS/INSA

Note: The category “All cases” includes 11,915 cases for whom place of birth and route of transmission was known and an additional 421 cases for whom place of birth was unknown and/or route of transmission was unknown or corresponded to other routes of transmission.

Figure 2.3.4. Proportion of new HIV diagnoses by CD4⁺ T-cell count/mm³ category at diagnosis, by place of birth and main route of transmission, Portugal, 2005-2017 (n = 12,336).

The highest proportions of cases presenting at a later stage of HIV infection ($CD4^+$ T-cell count < 350 cells/ mm^3) were observed in foreign-born (65.6%) and native-born (63.1%) men infected heterosexually, while the lowest proportions were observed among foreign-born (37.8%) and native-born (42.1%) MSM. The proportion of men infected by heterosexual route who were late diagnosed is significantly higher than in women, both in native (63.1% vs 47.1%, $p < 0.001$) and in foreign-born cases (65.6% vs 47.1%, $p < 0.001$) (**Figure 2.3.4**). There were no significant differences between native and foreign-born individuals across the different transmission groups, except in women infected heterosexually, where a higher proportion of foreign-born was late diagnosed compared to native-born (52,0% vs 47.1%, $p < 0.001$).

Between 2005 and 2017, the overall median $CD4^+$ T-cell count/ mm^3 at diagnosis steadily increased from 258 cells/ mm^3 (IQR: 83–469) to 334 cells/ mm^3 (IQR: 149–544) (p value for trend 0.007). A statistically significant increase was observed in all age groups, except the youngest and the oldest individuals, and the incline was the steepest in age group 30–39 years. Throughout the study period, median $CD4^+$ T-cell count/ mm^3 at diagnosis remained highest among those younger than 30 years (**Figure 2.3.5**).



Source: DGS/INSA

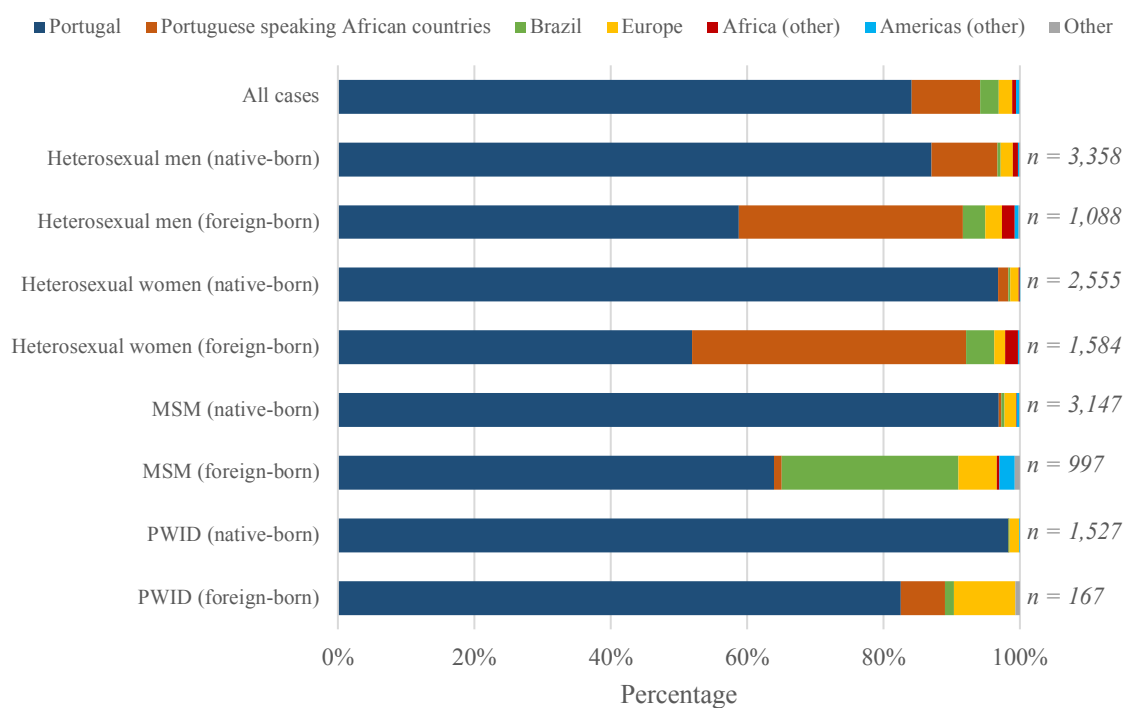
Figure 2.3.5. Median $CD4^+$ T-cell count/ mm^3 at diagnosis by age group, Portugal, 2005-2017 ($n = 12,336$).

2. RESULTS

Total proportion of cases with an AIDS defining illness at HIV diagnosis was 20.9%, being higher in native and foreign-born men with heterosexual transmission (29.5% and 29.6%, respectively) and PWID (28.3% and 26.3%, respectively), without significant differences for place of birth ($p=0.930$ and $p=0.480$, respectively).

2.3.3.4. Probable place of acquisition of HIV infection, 2005-2017

Information on probable place of HIV acquisition was reported on 14,798 (63.1%) cases newly diagnosed in Portugal between 2005 and 2017. Overall, 83.5% of all cases reported Portugal as probable place of HIV acquisition, followed by Portuguese speaking African countries (10.1%) and Brazil (3.1%) (**Figure 2.3.6**).



Source: DGS/INSA

Note: The category “All cases” includes 14,423 cases for whom place of birth, route of transmission and probable country of HIV acquisition was known and an additional 375 cases for whom place of birth was unknown and/or route of transmission was unknown or corresponded to other routes of transmission.

Figure 2.3.6. Proportion of new HIV diagnoses by probable country of acquisition of HIV infection, by place of birth and main route of transmission, Portugal, 2005-2017 ($n = 14,798$).

Portugal was the most reported probable place for HIV acquisition in all transmission groups. The second most reported place was Portuguese speaking African countries, both by native and foreign-born males infected heterosexually (10.0% and 32.8%, respectively). Compared to foreign-born men, a higher proportion of foreign-born women with heterosexual transmission reported Portuguese speaking African countries as probable place of HIV acquisition (40.7% vs 32.8%, $p < 0.001$), including Guinea-Bissau (18.9%), Angola (13.0%) and Mozambique (4.5%) (**Figure 2.3.6**). European countries (1.8%) were the second probable place for HIV acquisition in native-born MSM, while foreign-born MSM reported Brazil (28.6%), and native and foreign-born PWID reported European countries (1.6% and 10.2%, respectively).

2.3.4. Discussion

Our analysis shows a sharp decline in the number of new HIV infections in Portugal between 2005 and 2017, influenced by a significant decrease in both native and foreign-born PWID and cases with heterosexual transmission, but not in MSM. However, trends in new HIV diagnoses, particularly in recent years, must be interpreted carefully, because of known reporting delay [8]. Additionally, existing HIV testing services in Portugal might also influence trends. In fact, the increasing trend in new HIV diagnoses observed in MSM, particularly after 2011, can be partially explained by the opening of important community-based HIV testing services targeting MSM in Lisbon as well as other projects focused on HIV screening funded by the national HIV/AIDS Programme [9]. The trend observed both in native and foreign-born MSM can, therefore, be an artefact due to increased testing in this key population. On the other hand, the number of diagnoses and the male-to-female ratio in foreign-born individuals infected heterosexually must take into account different gender behaviours towards healthcare seeking and, in women, provision of antenatal care, as HIV screening has been part of routine antenatal testing since 2004.

Overall, MSM represent the second most common transmission group in Portugal but, similarly to what is observed in other countries, they are diagnosed earlier than other groups. As recognised in the literature, this fact might be linked to increased awareness of risk behaviour and higher testing rates, compared to other groups [2].

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Late diagnosis remains a significant problem, particularly in PWID, in native heterosexual men and in foreign-born men and women reporting heterosexual transmission, with more than half of HIV cases being late diagnosed in those groups. This situation is similar to what is observed in other EU/EEA countries [2,10,11], suggesting that access to and uptake of HIV testing remains an important challenge in Portugal.

HIV diagnoses in older adults (≥ 50 years) in Portugal account for an important share of the cases, particularly in native-born men infected heterosexually. These findings corroborate the ones described at European level for new diagnosis among adults aged 50 or older and where Portugal was one of the countries with the highest rate of HIV diagnosis for that age group [12].

Despite a steady decline in recent years, foreign-born persons still account for an important proportion (29.7%) of new HIV cases in Portugal. Most of these cases (31.7%) indicate Portugal as the country where HIV infection was acquired, particularly PWID and MSM, highlighting the need for effective interventions targeting this vulnerable population [13-15]. It should also be noted that Portuguese speaking African countries were the probable place of HIV acquisition for 10.0% of native heterosexual men, which is due to the constant migratory flow to the former Portuguese colonies, particularly during the recent economic recession in Portugal [16].

Several national policies aimed to address some of these issues are already in place. Besides effective harm reduction policies in place since the 1990s [17], guidelines on HIV testing and diagnosis have been issued by the Directorate-General of Health [18]. Since April 2018, pre-exposure prophylaxis is available for free in selected Portuguese public hospitals, following guidelines from the Directorate-General of Health [19]. It will be crucial to analyse, in the near future, the impact of pre-exposure prophylaxis on new HIV infections among MSM in Portugal. Also, legal barriers to HIV self-testing commercialisation have been lifted in 2018 [20], making it possible the provision of out-of-counter HIV self-testing kits in all community pharmacies in Portugal since October 2019.

Limitations to our analysis include incomplete data for some variables, including CD4⁺ T-cell count at diagnosis, place of birth and transmission route. This problem has

improved since 2014, when electronic notification of transmissible diseases became mandatory in Portugal. It should also be noted that a small number of cases classified as foreign-born correspond to people born in the Portuguese African colonies and moved to Portugal after decolonisation in the 1970s. The content of the variable “*Probable country of acquisition of HIV infection*” might also reflect more the notifying clinician or the patient assumption rather than the exact place of transmission.

Portugal has been successful in sharply reducing its HIV epidemics during the last two decades. However, in order to accelerate the decline of new HIV cases, the country needs to scale-up efforts to expand effective prevention measures, early diagnosis and continued access and retention in care. Reaching those most-at-risk will require innovative approaches and sound national policies. Some important steps were already taken, although it is yet too soon to evaluate their impact on the epidemics.

2.3.5. References

1. Pharris A, Quinten C, Tivoschi L, Spiteri G, Amato-Gauci AJ; ECDC HIV/AIDS Surveillance Network. Trends in HIV surveillance data in the EU/EEA, 2005 to 2014: new HIV diagnoses still increasing in men who have sex with men. *Euro Surveill.* 2015;20(47). DOI: <http://doi.org/10.2807/1560-7917.ES.2015.20.47.30071>
2. European Centre for Disease Prevention and Control, WHO Regional Office for Europe. *HIV/AIDS surveillance in Europe 2018 – 2017 data*. Copenhagen: WHO Regional Office for Europe; 2018. <https://ecdc.europa.eu/sites/portal/files/documents/hiv-aids-surveillance-europe-2018.pdf> Accessed 15 September 2019.
3. Comunidade dos Países de Língua Portuguesa (CPLP), Joint United Nations Program on HIV/AIDS (UNAIDS). *Epidemia de VIH nos países de língua oficial portuguesa – Situação atual e perspectivas futuras rumo ao acesso universal à prevenção, tratamento e cuidados.* 2010. <https://www.cplp.org/Files/Filer/VIH%20em%20pa%C3%ADses%20de%20L%C>

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4. National Institute of Health Dr Ricardo Jorge (INSA). *Infeção VIH e SIDA: a situação em Portugal a 31 de dezembro de 2017 [HIV Infection and AIDS: situation in Portugal on 31 December 2017]*. Lisbon: INSA; 2018. http://repositorio.insa.pt/bitstream/10400.18/5666/5/INSA_Relatorio_VIH_e_SID_A_2017.pdf Accessed 15 September 2019.
5. Portaria No. 258/2005 [Ordinance No. 258/2005], of 16 March 2005. Integrates HIV infection in the list of mandatory notifiable diseases. *Diário da República [Government Gazette]* No. 53, Serie I-B. 16 March 2005. [Portuguese] <https://dre.pt/application/conteudo/572670> Accessed 15 September 2019.
6. Despacho n.º 5855/2014 [Dispatch No. 5855/2014], of 5 May 2014. Makes compulsory the use of the electronic application SINAVE to notify transmissible diseases and other public health threats. *Diário da República [Government Gazette]* No. 85, Serie II. 5 May 2014. [Portuguese] <https://dre.pt/application/conteudo/25688419> Accessed 15 September 2019.
7. Antinori A, Coenen T, Costagiola D, Dedes N, Ellefson M, Gatell J, *et al.* Late presentation of HIV infection: a consensus definition. *HIV Med.* 2011;12(1):61-4. DOI: <http://doi.org/10.1111/j.1468-1293.2010.00857.x>
8. Rosinska M, Pantazis N, Janiec J, Pharris A, Amato-Gauci AJ, Quinten C; ECDC HIV/AIDS Surveillance Network. Potential adjustment methodology for missing data and reporting delay in the HIV Surveillance System, European Union/European Economic Area, 2015. *Euro Surveill.* 2018;23(23). DOI: <http://doi.org/10.2807/1560-7917.ES.2018.23.23.1700359>
9. Augusto GF, Aldir I, Bettencourt J, Dias SF, Abrantes A, Martins MRO. Preventing HIV under financial constraints: the case of the Portuguese HIV/AIDS Programme. *Health Policy [IN PRESS]*

10. Late presenters working group in COHERE in EuroCoord, Mocroft A, Lundgren J, Antinori A, Monforte Ad, Brännström J, Bonnet F, *et al.* Late presentation for HIV care across Europe: update from the Collaboration of Observational HIV Epidemiological Research Europe (COHERE) study, 2010 to 2013. *Euro Surveill.* 2015;20(47). DOI: <http://doi.org/10.2807/1560-7917.ES.2015.20.47.30070>
11. Wójcik-Cichy K, Jabłonowska O, Piekarska A, Jabłonowska E. The high incidence of late presenters for HIV/AIDS infection in the Lodz province, Poland in the years 2009-2016: we are still far from the UNAIDS 90% target. *AIDS Care.* 2018;30(12):1538-1541. DOI: <http://doi.org/10.1080/09540121.2018.1470306>
12. Tivoschi L, Gomes Dias J, Pharris A; EU/EEA HIV Surveillance Network. New HIV diagnoses among adults aged 50 years or older in 31 European countries, 2004-15: an analysis of surveillance data. *Lancet HIV.* 2017;4(11):e514-e521. DOI: [http://doi.org/10.1016/S2352-3018\(17\)30155-8](http://doi.org/10.1016/S2352-3018(17)30155-8)
13. Hernando V, Álvarez-Del Arco D, Alejos B, Monge S, AmatoGauci AJ, Noori T, *et al.* HIV Infection in Migrant Populations in the European Union and European Economic Area in 2007-2012: An Epidemic on the Move. *J Acquir Immune Defic Syndr.* 2015;70(2):204-11. DOI: <http://doi.org/10.1097/QAI.0000000000000717>
14. Fakoya I, Álvarez-del Arco D, Woode-Owusu M, Monge S, Rivero-Montesdeoca Y, Delpech V, *et al.* A systematic review of post-migration acquisition of HIV among migrants from countries with generalised HIV epidemics living in Europe: implications for effectively managing HIV prevention programmes and policy. *BMC Public Health.* 2015;15(1):561. DOI: <http://doi.org/10.1186/s12889-015-1852-9>
15. Dias S, Gama A, Tavares AM, Reigado V, Simões D, Carreiras E, Mora C, Pinto Ferreira A. Are Opportunities Being Missed? Burden of HIV, STI and TB, and Unawareness of HIV among African Migrants. *Int J Environ Res Public Health.* 2019;16(15). pii: E2710. DOI: <http://doi.org/10.3390/ijerph16152710>

2. RESULTS

16. Jesus NMP. *Migrações recentes de portuguesas para Angola: contextos e estratégias* [Recent Portuguese migrations to Angola: contexts and strategies]. Master's thesis, University of Minho, Portugal; 2015. <http://hdl.handle.net/1822/40807> Accessed 15 September 2019.
17. Csete J, Kamarulzaman A, Kazatchkine M, *et al.* Public health and international drug policy. *Lancet*. 2016;387(10026):1427–1480. DOI: [http://doi.org/10.1016/S0140-6736\(16\)00619-X](http://doi.org/10.1016/S0140-6736(16)00619-X)
18. Directorate-General of Health (DGS). Diagnosis and laboratory screening of HIV Infection. *Norma No. 058/2011* [Normative Document No. 058/2011]. 28 December 2011 updated on 10 December 2014 [Portuguese]. <https://www.dgs.pt/directrizes-da-dgs/normas-e-circulares-normativas/norma-n-0582011-de-28122011-jpg.aspx> Accessed 15 September 2019.
19. Directorate-General of Health (DGS). Pre-Exposure Prophylaxis of HIV Infection in Adults. *Norma No. 025/2017* [Normative Document No. 025/2017]. 28 November 2017 updated on 16 May 2018 [Portuguese]. <https://www.dgs.pt/directrizes-da-dgs/normas-e-circulares-normativas/norma-n-0252017-de-28112017-pdf.aspx> Accessed 15 September 2019.
20. Decreto-Lei No. 79/2018 [Decree-Law No. 79/2018], of 15 October 2018. Allows the direct provision to the public of devices for HIV, HCV and HBV self-testing. *Diário da República* [Government Gazette] No. 198, Serie I. 15 October 2018. [Portuguese] <https://dre.pt/application/conteudo/116673879> Accessed 15 September 2019.

2.4. HIV prevention and treatment in Southern Europe in the aftermath of bailout programmes

2.4.1. Introduction

The financial crisis that spread from the USA in 2008 and engulfed Europe had dramatic consequences for many European countries [1]. In the context of the Eurozone, the global financial crisis became a sovereign debt crisis with several member states struggling to repay or refinance their government debts. Several Eurozone countries were particularly affected by the crisis. In the context of the Eurozone, Greece, Ireland, Portugal, Spain and Cyprus received European Union (EU) financial assistance, with Greece receiving three bailout programmes between 2010 and 2018, while programmes in Portugal and Cyprus lasted for three years (2011-14 and 2013-16, respectively) and the Spanish programme lasted for 18 months (2012-14) [2]. The bailouts included a series of severe austerity measures to be implemented by governments over the length of the assistance programme.

Together with a strong economic recession, countries implemented cuts in the health sector, including a 30% reduction in Greek health budget in 2012 [1], a 14% reduction in health and social services budget in Spain in 2012 [3], and an overall decrease of the Portuguese National Health Service budget by 14% between 2010 and 2012 [4]. Other cost-containment measures were implemented during the financial assistance programmes, namely restrictions to universal health coverage in Spain, since the entitlement to health care became based on contributions to the system, excluding young people over 26 who have never entered the job market and illegal immigrants from receiving health care [5]. In Greece, it is estimated that 2.5 million people (the long-term unemployed and their dependents, as well as some other groups) lost their health insurance coverage after 2009 and, therefore, access to publicly provided services, during the crisis [6]. That situation lasted until 2016, when new legislation to cover people who lost insurance coverage was approved.

The impact of the economic crisis on infectious diseases' treatment and control has been a subject of concern [7]. Many countries have reduced budgets dedicated to control and

2. RESULTS

prevention of infectious diseases, including HIV [8,9]. In 2011, a number of HIV outbreaks among people who inject drugs (PWID) have been reported in Greece and Romania [10,11].

The current global HIV response aims to mobilise countries worldwide to meet specific targets in testing, prevention and treatment. In 2015, the Joint United Nations Programme on HIV and AIDS (UNAIDS) called for countries to have 90% of all people living with HIV (PLHIV) diagnosed, to have 90% of those diagnosed receiving antiretroviral treatment (ART) and to have 90% of those receiving ART virally suppressed, by 2020 [12]. WHO also issued a series of recommendations in the areas of pre-exposure prophylaxis (PrEP), HIV self-testing (HIVST), and treating any person diagnosed with HIV irrespective of CD4 count/disease stage [13-15].

Our article aims to describe HIV response and progress towards the current global HIV targets in four Southern European countries which received financial adjustment programmes.

2.4.2. Methods

We selected four Southern European countries which received economic assistance by the EU – Cyprus, Greece, Portugal, and Spain – given the cultural similarity to health systems in those countries, three of which also sharing a recent history of democratic development.

We searched for reliable, generalisable, recent country data on WHO, UNAIDS and European Centre for Disease Prevention and Control (ECDC) databases and reports as well as national reports with the aim of characterising the HIV epidemic, the progress in reaching UNAIDS 90-90-90 targets, and the uptake of global norms and standards on HIV prevention, testing, and treatment. We communicated with public health officials in the HIV programmes within each of these countries to validate and complement our findings, recognising that each country has unique features in terms of health system and HIV policy prioritisation.

For our analysis, we considered the following indicators:

- a) *HIV epidemiology* – total number of new HIV cases per 100,000 population reported to ECDC between 2005 and 2017;
- b) *adoption of Treat All* – status of each selected country regarding the adoption of WHO’s recommendation that all people diagnosed with HIV should immediately initiate ART irrespective of disease stage/CD4 count, describing the number of PLHIV receiving ART in 2008 and in the most recent year available;
- c) *progress towards the UNAIDS global targets of 90-90-90* – for 2013-14 and the most recent year available, we included official country data on the percentage of PLHIV who knew their status, percentage of diagnosed PLHIV who were receiving ART and percentage of PLHIV receiving ART who were virally suppressed;
- d) *adoption/implementation of PrEP* – status of each selected country regarding the formal implementation of PrEP as of November 2019, in the context of the EU/European Economic Area (EEA); and
- e) *adoption/implementation of WHO’s HIV self-testing (HIVST) recommendation* – status of each selected country regarding the formal implementation of HIVST as of July 2019, in the context of the EU/EEA.

We complemented the characterisation of national policies regarding PrEP and HIVST with additional sources of information including national legislation and media coverages.

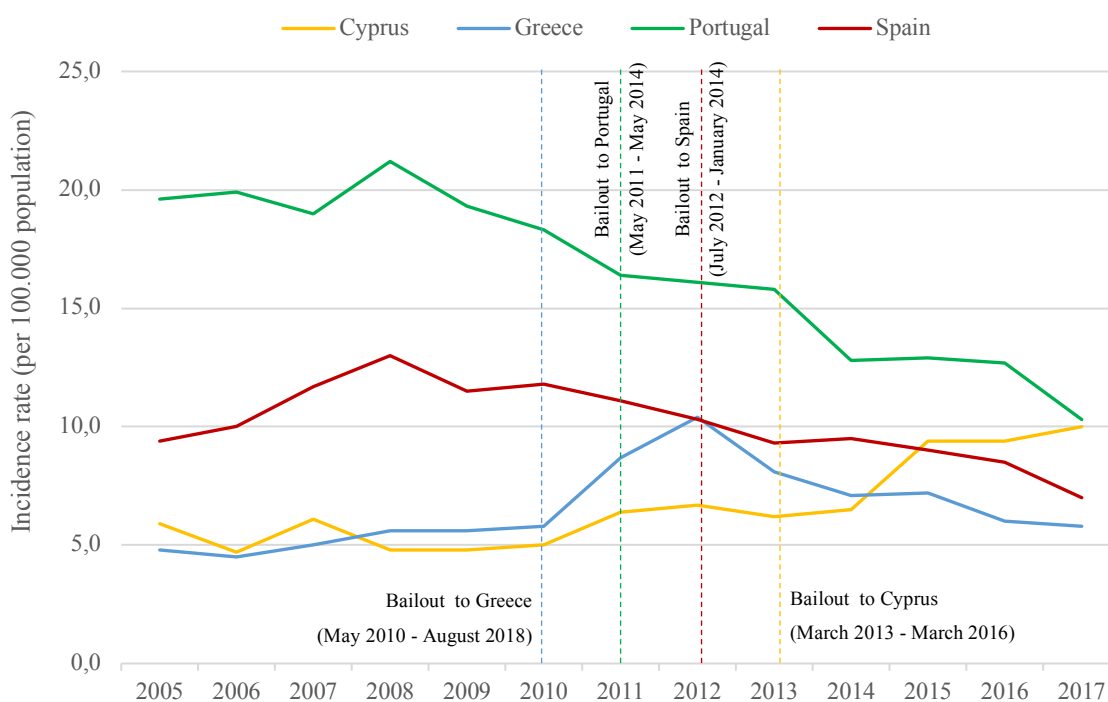
2.4.3. Results

2.4.3.1. HIV epidemiology

While men who have sex with men (MSM) is the main route of HIV transmission in Cyprus, Greece and Spain, heterosexual contact is the main HIV transmission mode in Portugal [16]. The selected countries show different trends in HIV incidence rates during the analysed period (**Figure 2.4.1**). Portugal recorded in 2005 19.6 new HIV cases per 100,000 population, a figure four times higher than in Cyprus and three times higher than in Greece. There was a steady decrease on HIV incidence rate in both Spain and Portugal since 2008, this trend being maintained during the economic crisis and the financial

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assistance programmes. By 2017, Portugal's HIV incidence rate (10.3) had converged with Cyprus (10.0), still being almost two times higher than in Greece (5.8) (**Figure 2.4.1**). Greece reported an increase in new HIV infections between 2010 and 2012, reaching a peak of 10.3 cases per 100,000 population in 2012 (**Figure 2.4.1**). During this period the country has experienced an outbreak of HIV among injecting drug users, with the number of newly diagnosed cases increasing from 29 in 2010 to 523 in 2012 in this group. HIV incidence decreased in the following years but the number of new cases among injecting drug users in 2017 ($n=86$) remains over seven times higher than in 2007 ($n=12$). In Cyprus, HIV incidence rate has increased since the onset of the economic crisis in 2010, and particularly during the economic adjustment programme (2013-16). The number of new HIV cases in the country by the end of 2017 ($n=85$) was twice as much as in 2010 ($n=41$) [16].



Source: ECDC [16]

Figure 2.4.1. New HIV diagnoses (rate per 100.000 population) in selected countries, 2005-17.

2.4.3.2. Treat all

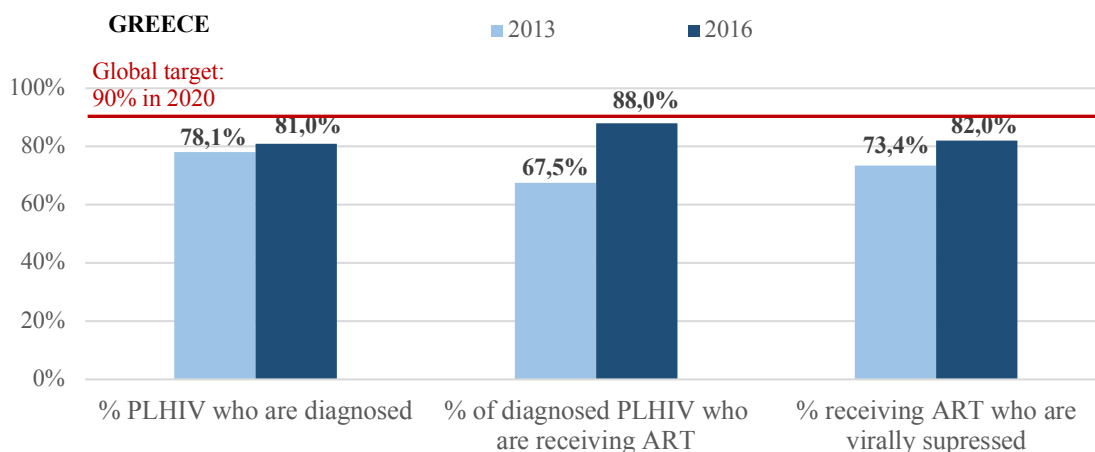
In 2013, WHO recommended that ART should be initiated in all individuals with HIV with CD4 count between 350 and 500 cells/mm³ regardless of WHO clinical stage [17]. Later, in 2016, WHO updated and launched new policy recommendations on the clinical and service delivery aspects of HIV treatment and care, and raised the bar to treat all PLHIV irrespective of CD4 count [13]. The main purpose of this policy was to link and retain all people infected by HIV in appropriate care without waiting for deterioration of their immunological status, as it became evident that early initiation of ART is beneficial both to the health of the person being treated and in preventing onward HIV transmission [18,19].

In 2014, Spain used the threshold of CD4 count below 500 cells/mm³ to initiate ART, while Cyprus, Greece and Portugal were generally still using the CD4 count below 350 cells/mm³ [20]. As of 2016, all selected countries have adopted WHO's recommendation of initiating ART regardless of CD4 count [20]. As a consequence, the number of PLHIV receiving ART has shown a remarkable increase over the recent years in all selected countries. Although there is no data available for 2016, Cyprus has increased the number of PLHIV receiving ART by 47% (from 170 in 2008 to 250 in 2014) [21,22]. In Greece, the number of PLHIV receiving ART more than doubled between 2008 and 2017 (from 4,236 to 9,594) [21,23], the same happening in Portugal (from 12,366 in 2008 to 31,000 in 2016) [21,23]. Finally, in Spain the number of PLHIV receiving ART increased by 41% between 2008 and 2016 (from 82,710 to 116,408) [21,23].

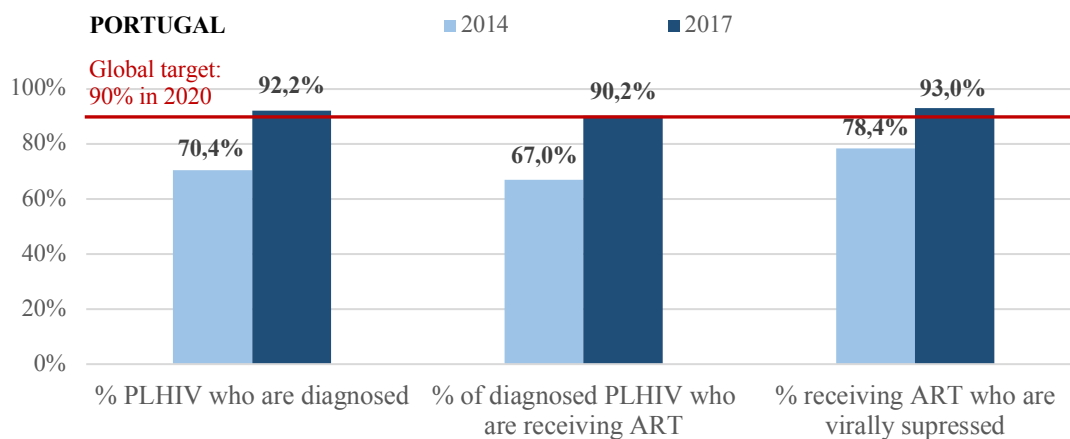
2.4.3.3. Meeting the 90-90-90 targets

In 2014, the UNAIDS launched the 90–90–90 targets, the aim of which was to scale-up global HIV response as part of an overall strategy to end AIDS epidemic by 2030. By 2020, countries should aim to have 90% of all people living with HIV diagnosed, to have 90% of those diagnosed receiving sustained ART, and to have 90% of those receiving ART with viral suppression [12]. These ambitious targets have been regularly monitored globally, and countries have reported significant progress towards reaching the 90-90-90 (Figure 2.4.2).

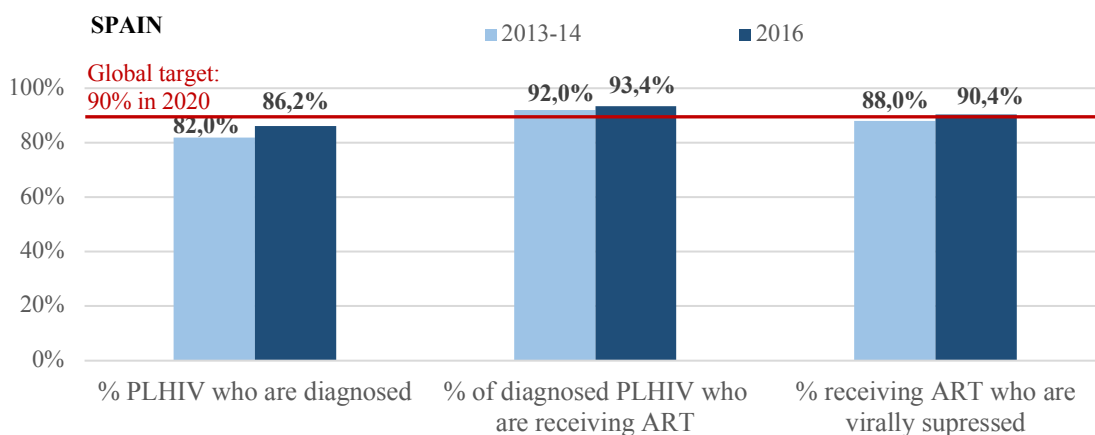
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Sources: 2013 data – ECDC [23]; 2016 data – Greek National HIV Strategic Plan (unpublished)



Sources: 2014 data – ECDC [23]; 2017 data – Portuguese HIV/AIDS Programme (unpublished)



Sources: 2013-14 data – ECDC [23]; 2016 data – National Centre for Epidemiology/National AIDS Plan [26]

Note: No data available for Cyprus.

Figure 2.4.2. HIV care and treatment cascade in selected countries, 2013-14 and most recent year.

In Greece, as of 2016, approximately 20% of people living with HIV do not know their status. The proportion of people who have begun ART increased from 68% in 2013 to 88% in 2016, as a result of Greek guidelines introducing the *Treat All* recommendation in 2015. One of the challenges in Greece is that, as of 2016, there is an absence of viral load testing within the national HIV treatment programme. Nonetheless, as of 2016, 82% of PLHIV were virally suppressed, based on the Greek cascade-of-care analysis.

By the end of 2017, Portugal has reached all 90-90-90 targets (**Figure 2.4.2.**). As in Greece, Portugal adopted new guidelines on HIV treatment, introducing the *Treat All* recommendation in 2015 [24]. The country has been successful in diagnosing HIV infections – with an estimated 8% of PLHIV who do not know their status as of 2017 – and expanding ART – with an estimated 10% of diagnosed PLHIV who were not receiving ART by the end of 2017 (**Figure 2.4.2.**). In 2016, Portugal recorded 91.7% of PLHIV diagnosed, 86.8% of those diagnosed receiving ART, and 90.3% of those receiving ART virally suppressed [25].

As of 2016, Spain was very close to reach UNAIDS targets for HIV treatment, but additional efforts are needed to increase the proportion of PLHIV who know their status: as of 2016, around 14% of PLHIV do not know their status [26].

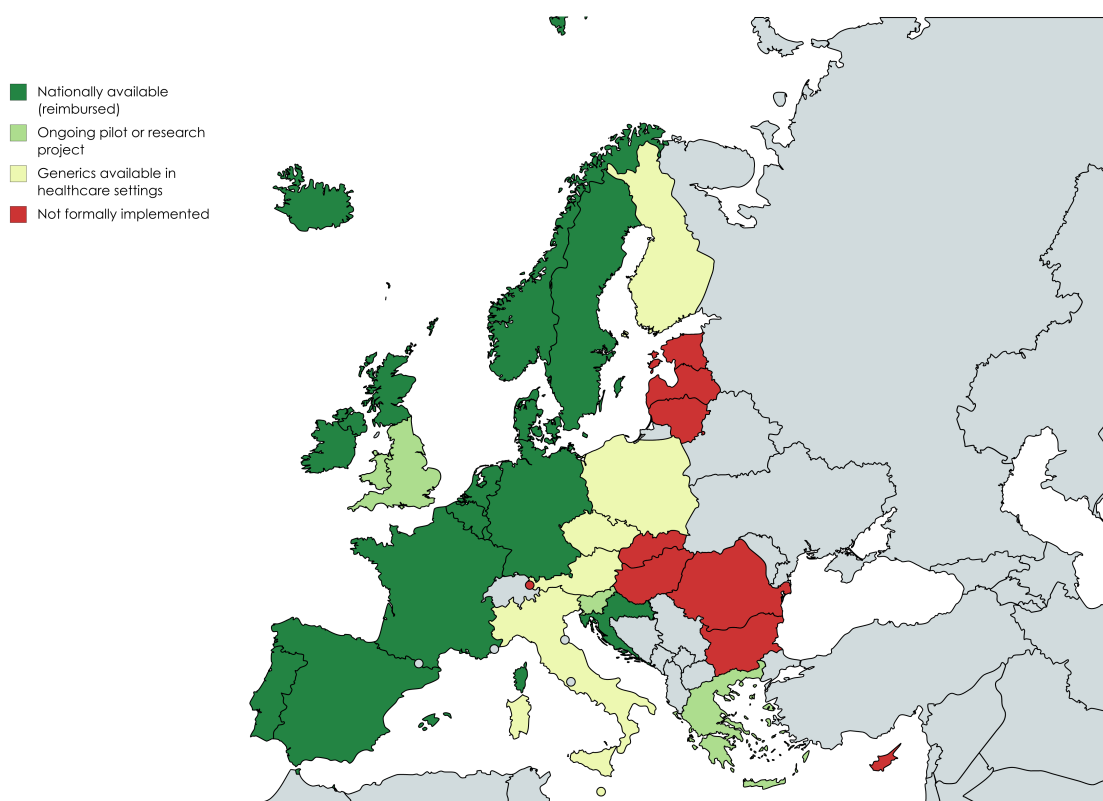
2.4.3.4. Implementing pre-exposure prophylaxis

As of September 2015, WHO recommends that people at substantial risk of HIV infection (e.g. men who have sex with men who do not consistently use condoms) should be offered PrEP as an additional prevention choice, as part of comprehensive prevention [13]. Several countries have implemented either pilot (demonstration projects) or full-scale PrEP programmes [27].

Portugal has joined other Western and Northern European countries where the government has been offering PrEP under the public sector (**Figure 2.4.3.**). Among the selected countries, Portugal was the first to publish a national guidelines document, and thus, to implement a policy on PrEP [28]. PrEP is currently being provided for free at hospital setting only, upon referral for PrEP consultation. PrEP delivery has been in place since April 2018 and, by December 2018, around 600 people were being followed in PrEP consultation.

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In 2019, a technical working group convened by the Greek Ministry of Health submitted an implementation plan for PrEP. This plan is a key pillar of a broader national HIV strategic plan proposal that was submitted at the same time to the Ministry. Currently, there is no formal access to PrEP in the public or private health system in Greece. A PrEP demonstration project was completed in May of 2019, and project participants were not offered sustained access to PrEP upon completion. The Greek national plan proposes PrEP being provided for free under the national health system, while it also recommends that PrEP is available in pharmacies with a prescription for an out-of-pocket payment. The process of PrEP implementation in Spain has started in September 2016 [29], and since 2017 two pilot projects are in place in the country: one in Barcelona and another one in San Sebastian/Donostia [30]. In October 2019, the Spanish Inter-ministerial Price Commission agreed on the inclusion of PrEP in the health services package and PrEP started to be provided in the public sector by the end of 2019 [31].



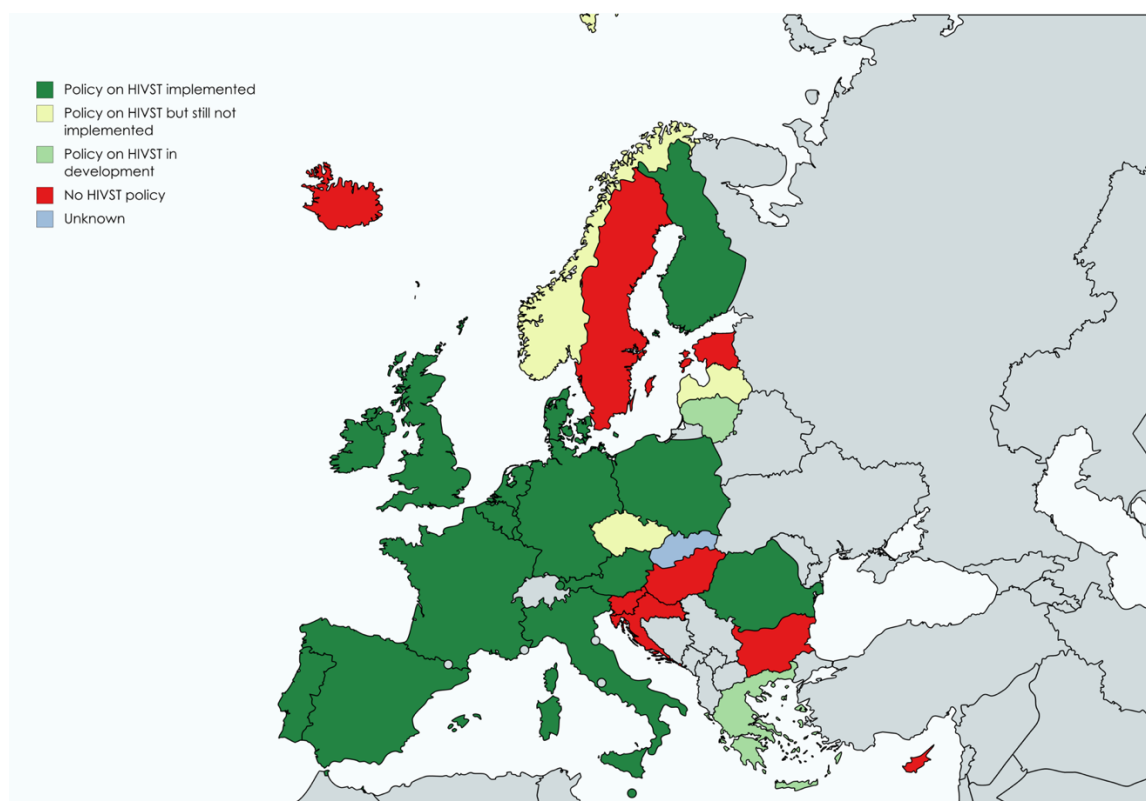
Source: Authors based on ECDC data

Figure 2.4.3. Status of formal PrEP implementation, EU/EEA, November 2019.

Lastly, for Cyprus, PrEP as a policy is not in place. A community-led consultation in partnership with the Ministry of Health took place in May 2019. There are ongoing plans to further engage Ministry of Health, WHO, and civil society on how to effectively introduce PrEP. Most recently, a PrEP technical working group will be convened in the first quarter of 2020 to ensure access is expedited for people living in Cyprus

2.4.3.5. Implementing HIVST

HIVST has not been adopted in Cyprus or Greece (**Figure 2.4.4**). In Greece, a current ministerial decree makes it illegal for any HIV test to be imported, marketed and sold as an HIV self-test [32]. Any effort to introduce HIVST in the country, even in the setting of an implementation research study, would require a new ministerial decree to be issued. That was the case in Spain and Portugal. In Spain, a Royal Decree of 2017 regulated the commercialisation of health devices for *in vitro* diagnosis, making it possible selling HIVST



Source: Authors based on WHO data

Figure 2.4.4. Status of HIV self-testing (HIVST) implementation, EU/EEA, July 2019.

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in community pharmacies [33]. Since January 2018, HIVST kits are sold in pharmacies in Spain without medical prescription at a cost of approximately 29 EUR [34]. Likewise, in October 2018, the Portuguese government lifted existing legal barriers to allow the commercialisation of HIVST in community pharmacies [35], but it was not until October 2019 when HIVST kits became available at community pharmacies in Portugal without medical prescription, at a cost of approximately 25 EUR [36].

2.4.4. Discussion

Our findings show that all selected countries successfully implemented WHO's *Treat All* recommendation, with a remarkable increase of the number of PLHIV receiving ART. As of 2017, Portugal has already met all UNAIDS 90-90-90 targets for HIV treatment, while, as of 2016, Spain was very close to meet those targets, needing to strengthen efforts to increase the percentage of PLHIV who know their status. As of 2016, Greece was still falling behind all three targets. Among all four selected countries, Portugal is the only one with both PrEP and HIVST nationally implemented, while Cyprus was the only one with no implementation of either of these policies. Spain has had an HIVST policy in place, and has most recently made PrEP available through its national health system, with Catalonia and Madrid regions already providing PrEP, as of January 2020. Greece completed a PrEP pilot in May 2019, and a formal implementation plan has been submitted to the Ministry of Health as of July 2019. A transition to a new government in July 2019 has resulted in a delay to PrEP access in Greece, and all pilot participants were not offered to continue on PrEP after pilot completion, which raises ethical concerns.

HIV incidence trends observed in the four countries vary. Despite a severe economic downturn coupled with austerity measures, where one could have expected an increase in HIV transmission, HIV incidence has been decreasing since 2008 in both Portugal and Spain. In contrast, HIV incidence has increased in Greece, mainly due to an HIV outbreak among PWID, with the number of new HIV infections in this population increasing 15-fold from 2010 to 2011. This outbreak has been well characterized in the literature [37,38], and response in Greece was to invest in resources to 'seek, test and treat' people within those injecting/sexual networks of PWIDs. A programme entitled Aristotle

Programme was activated to promote testing and strengthen linkage to harm reduction services for PWIDs in Athens, resulting in a reduction in new HIV cases in 2013 [39]. In Cyprus, HIV incidence has increased following the implementation of the assistance programme. The country has witnessed an increasing number of new HIV cases among MSM, exposing the lack of an effective HIV response targeting this key population. Stigma against PLHIV, poor sexual health information activities, and lack of anonymity and confidentiality in HIV testing services provided by the public sector were pointed as red flags in the Cypriot HIV response [22].

A number of reasons in each of the four selected countries may have played a role in explaining the differences observed in HIV policies. Although anticipated general elections took place in Portugal in June 2011, following the bailout, both Spain and Portugal had political stability during the implementation of the respective adjustment programmes. In contrast, Greece experienced frequent political change between 2010 and 2015; also, in Cyprus, the bailout programme determined a change in government in 2013. Thus, implementation of HIV policies has had different prioritization among the selected countries, with policies taking longer time to be implemented where political environment was not favourable. Also, the different economic context in each country could have played a role in funding HIV programmes or, at least, in making that funding a priority. Finally, a generally weak primary care and prevention services in Greece and Cyprus, as well as worse access and financial protection, might have also influenced different results in those countries. With one the highest HIV incidence rates, tackling HIV remained a political priority in Portugal and policy implementation continued despite the economic crisis. The resilience of the Portuguese health system and the strong civil society might also explain the results achieved in the country. Additionally, the country has had a progressive drug policy implemented for about two decades, in contrast with countries like Greece and Cyprus, which might also have reflected on the countries' response to HIV.

As HIV transmission remains a major public health challenge for EU/EEA countries, the adoption of multicomponent interventions and the inclusion of PrEP and HIVST into the package of prevention and control interventions could help current interventions [16]. Overall, timely testing and diagnosis of HIV constitutes the largest gap in the continuums

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of care. In our analysis, Portugal stands as a successful example among the selected countries: despite a very difficult period of financial assistance and economic downturn, the country kept its HIV incidence declining while expanding testing and treatment. A number of reasons may explain this situation. Besides transitory cuts in its budget in 2012-13, the Portuguese HIV/AIDS Programme prioritised investments in expansion of HIV prevention and testing through community-based organisations. In fact, these organisations played an essential role in effectively reaching those at-risk groups with condoms and HIV rapid testing. Portugal has successfully increased the number of PLHIV receiving ART, suggesting that the Portuguese National Health Service was able to respond well to the additional number of people who needed ART dispensing. A strong political prioritisation of HIV/AIDS enabled the expansion of HIV testing and treatment and the effective monitoring of the HIV continuum of care, thus allowing Portugal to meet the UNAIDS 90-90-90 targets by the end of 2017. In contrast, failures in HIV response due to budgetary cuts and/or lack of prioritisation could have made progress in other countries, like Greece or Cyprus, less significant.

There is growing evidence suggesting that PrEP is highly effective in accelerating the reduction of new HIV infections in health jurisdictions where appreciable levels of coverage in people at risk for HIV is achieved. This has been reported and well characterised for settings that include New South Wales (Australia), London (UK) and San Francisco (USA) [40-42].

Countries implementing PrEP, including Portugal, which has made PrEP available through a hospital-based roll-out, should consider mechanisms to facilitate access to PrEP and can maximize impact by scaling up coverage: e.g. make PrEP available at community pharmacies under medical prescription or having it delivered by community-based organisations.

Limitations to our study include the unavailability of HIV cascade data from Cyprus, which did not allow a wider comparison and analysis, and the lack of more recent data for the remaining countries in this analysis. Lastly, it must be recognised that the understanding of each country's policy process and health prioritisation is a very complex and difficult task that must consider several factors left aside of this analysis.

The global financial crisis impacted public health in Europe, and had a particularly critical detriment to health systems in Southern Europe. In the context of HIV, the austerity measures, which were implemented in some countries in Southern Europe had implications for both HIV prevention and treatment.

The set of HIV indicators in our analysis addressed public health outcomes alongside policy adoption of new interventions recommended by WHO. Our key finding was that from the four countries compared, Greece, which experienced the longest assistance programme, had its health system weakened, which in turn resulted in adverse outcomes (defined by new HIV infections). In contrast, Portugal stands out as a country that successfully expanded HIV prevention and treatment and was able to meet the UNAIDS 90-90-90 targets and implement PrEP and HIVST nationally. Results from our analysis stress the importance of analysing national HIV policies and country progress in order to strengthen HIV response.

2.4.5. References

1. Ifanti AA, Argyriou AA, Kalofonou FH, Kalofonos HP: Financial crisis and austerity measures in Greece: their impact on health promotion policies and public health care. *Health Policy*. 2013;113(1-12): 8-12. DOI: <http://doi.org/10.1016/j.healthpol.2013.05.017>
2. European Commission. *EU financial assistance*. https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-financial-assistance_en Accessed 20 September 2019.
3. Legido-Quigley H, Otero L, la Parra D, Alvarez-Dardet C, Martin-Moreno JM, McKee M. Will austerity cuts dismantle the Spanish healthcare system? *BMJ*. 2013;346:f2363. DOI: <http://doi.org/10.1136/bmj.f2363>
4. Sakellarides C, Castelo-Branco L, Barbosa P, Azevedo H. The impact of the crisis on the health system and health in Portugal. In *Economic crisis, health systems and health in Europe: Country experience. Observatory Studies Series, No. 41*. Maresso A, Mladovsky P, Thomson S, et al., (Eds.). Copenhagen: European Observatory on

2. RESULTS

- Health Systems and Policies; 2015. https://www.ncbi.nlm.nih.gov/books/NBK447858/pdf/Bookshelf_NBK447858.pdf Accessed 20 September 2019.
5. Gallo P, Gené-Badia J. Cuts drive health system reforms in Spain. *Health Policy*. 2013;113(1-2):1-7. DOI: <http://doi.org/10.1016/j.healthpol.2013.06.016>
 6. Economou C, Kaitelidou D, Karanikolos M, Maresso A. Greece: Health System Review. *Health Syst Transit*. 2017;19(5):1-166. http://www.euro.who.int/__data/assets/pdf_file/0006/373695/hit-greece-eng.pdf?ua=1 Accessed 20 September 2019.
 7. ECDC – European Centre for Disease Prevention and Control. *Health inequalities, the financial crisis, and infectious disease in Europe*. Stockholm: ECDC; 2013. https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/Health_inequalities_financial_crisis.pdf Accessed 20 September 2019.
 8. Rechel B, Suhrcke M, Tsoлова S, Suk JE, Desai M, McKee M, Stuckler D, Abubakar I, Hunter P, Senek M, Semenza JC. Economic crisis and communicable disease control in Europe: a scoping study among national experts. *Health Policy*. 2011;103(2-3):168-75. DOI: <http://doi.org/10.1016/j.healthpol.2011.06.013>
 9. UNAIDS – Joint United Nations Programme on HIV/AIDS. *The Global Economic Crisis and HIV Prevention and Treatment Programmes: Vulnerabilities and Impact*. Geneva: UNAIDS/WHO, 2009. https://www.unaids.org/sites/default/files/media_asset/jc1734_econ_crisis_hiv_response_en_0.pdf Accessed 20 September 2019.
 10. EMCDDA & ECDC. *Joint EMCDDA and ECDC rapid risk assessment HIV in injecting drug users in the EU/EEA, following a reported increase of cases in Greece and Romania*. Stockholm: ECDC, Lisbon: EMCDDA; 2012. http://www.emcdda.europa.eu/system/files/publications/666/emcdda-ecdc-2012-riskassessment_321005.pdf Accessed 20 September 2019.

11. ECDC/WHO Europe – European Centre for Disease Prevention and Control/WHO Regional Office for Europe. *HIV/AIDS surveillance in Europe 2012*. Stockholm, ECDC; 2013. <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/hiv-aids-surveillance-report-2012-20131127.pdf> Accessed 20 September 2019.
12. UNAIDS – Joint United Nations Programme on HIV/AIDS. *UNAIDS Strategy 2016-2021*. Geneva: UNAIDS; 2015. http://www.unaids.org/en/resources/documents/2015/UNAIDS_PCB37_15-18 Accessed 20 September 2019.
13. World Health Organization. *Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV*. Geneva: WHO; 2015. <https://www.who.int/hiv/pub/guidelines/earlyrelease-arv/en/> Accessed 20 September 2019.
14. World Health Organization. *Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. Recommendations for a public health approach – Second edition*. Geneva: WHO; 2016. <https://www.who.int/hiv/pub/arv/arv-2016/en/> Accessed 20 September 2019.
15. World Health Organization. *Guidelines on HIV self-testing and partner notification. Supplement to consolidated guidelines on HIV testing services*. Geneva: WHO; 2016. <https://www.who.int/hiv/pub/self-testing/hiv-self-testing-guidelines/en/> Accessed 20 September 2019.
16. European Centre for Disease Prevention and Control, WHO Regional Office for Europe. *HIV/AIDS surveillance in Europe 2018 – 2017 data*. Copenhagen: WHO Regional Office for Europe; 2018. <https://ecdc.europa.eu/sites/portal/files/documents/hiv-aids-surveillance-europe-2018.pdf> Accessed 20 September 2019.
17. World Health Organization. *Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection*. Geneva: WHO; 2013.

2. RESULTS

- <https://www.who.int/hiv/pub/guidelines/arv2013/download/en/> Accessed 20 September 2019.
18. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N, *et al.* Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med.* 2011;365(6):493-505. DOI: <http://doi.org/10.1056/NEJMoa1105243>
19. INSIGHT START Study Group *at al.* Initiation of antiretroviral therapy in early asymptomatic HIV infection. *N Engl J Med.* 2016;373(9):795–807. DOI: <http://doi.org/10.1056/NEJMoa1506816>
20. European Centre for Disease Prevention and Control. *The status of the HIV response in the European Union/European Economic Area, 2016.* <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/Status-of-HIV-response-in-EU-EEA-2016-30-jan-2017.pdf> Accessed 20 September 2019.
21. UNAIDS – Joint United Nations Programme on HIV/AIDS. *Towards Universal Access: Scaling up priority HIV/AIDS interventions in the health sector – Progress Report 2009.* Geneva: UNAIDS; 2009. http://data.unaids.org/pub/report/2009/20090930_tuapr_2009_en.pdf Accessed 20 September 2019.
22. European Centre for Disease Prevention and Control. *Technical mission: HIV in Cyprus, 15–17 October 2014.* Stockholm: ECDC; 2015. <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/hiv-cyprus-2014.pdf> Accessed 20 September 2019.
23. European Centre for Disease Prevention and Control. *Continuum of HIV care. Monitoring implementation of the Dublin Declaration on partnership to fight HIV/AIDS in Europe and Central Asia: 2018 progress report.* Stockholm: ECDC; 2018. <https://ecdc.europa.eu/sites/portal/files/documents/HIV-continuum-of-care-monitoring-dublin-declaration-progress-report-2018.pdf> Accessed 20 September 2019.

24. Directorate-General of Health. *Recomendações Portuguesas para o tratamento da infeção por VIH-1 e VIH- 2 (Versão 1.0) [Portuguese Guidelines for Treatment of HIV-1 and HIV-2 Infection (Version 1.0)]*; 2015. <https://www.pnvihsida.dgs.pt/informacao-tecnica-e-cientifica111/recomendacoes-nacionais/-recomendacoes-portuguesas-para-o-tratamento-da-infecao-por-vih-1-e-vih-2-2015-pdf.aspx> Accessed 20 September 2019.
25. Directorate-General of Health/National Programme for HIV/AIDS Infection. *Infeção VIH e SIDA – Desafios e Estratégias 2018 [HIV Infection and AIDS – Challenges and Strategies 2018]*. Lisbon: DGS; 2018. <https://www.dgs.pt/documentos-e-publicacoes/infecao-vih-e-sida-desafios-e-estrategias-2018.aspx> Accessed 20 September 2019.
26. Unidad de vigilancia del VIH y conductas de riesgo. *Estimación del Continuo de Atención del VIH en España, 2016 [Estimation of Continuum of HIV Care in Spain 2016]*. Madrid: Centro Nacional de Epidemiología – Instituto de Salud Carlos III / Plan Nacional sobre el Sida – Dirección General de Salud Pública, Calidad e Innovación; 2019 [Spanish]. https://www.isciii.es/QueHacemos/Servicios/VigilanciaSaludPublicaRENAVE/EnfermedadesTransmisibles/Documents/VIH/INFORMES%20ESPECIALES/ESTIMACION_DEL_CONTINUO_DE_ATENCION_DEL_VIH_EN_ESPANA_2019.pdf#search=Estimacion%20atencion%20vih Accessed 20 September 2019.
27. Hodges-Mameletzis I, Dalal S, Msimanga-Radebe B, Rodolph M, Baggaley R. Going global: the adoption of the World Health Organization's enabling recommendation on oral pre-exposure prophylaxis for HIV. *Sex Health*. 2018;15(6):489-500. DOI: <http://doi.org/10.1071/SH18125>
28. Directorate-General of Health. Pre-Exposure Prophylaxis of HIV Infection in Adults. *Norma No. 025/2017 [Normative Document No. 025/2017]*. 28 November 2017 updated on 16 May 2018 [Portuguese]. <https://www.dgs.pt/directrizes-da-dgs/normas-e-circulares-normativas/norma-n-0252017-de-28112017-pdf.aspx> Accessed 20 September 2019.

2. RESULTS

29. García LM, Iniesta C, Garrido J, Fuster MJ, Pujol F, Meulbroek M, et al. HIV pre-exposure prophylaxis (PrEP) in Spain: political and administrative situation. *Enferm Infecc Microbiol Clin*. 2018. pii: S0213-005X(18)30199-X. DOI: <http://www.doi.org/10.1016/j.eimc.2018.05.012>
30. Resolución 9748, de 27 de julio de 2017 [Resolution No. 9748, of 27 July 2017]. *Boletín Oficial del Estado [Government Gazette]*, No. 193; Section III. 14 August 2017 [Spanish]. https://www.boe.es/diario_boe/txt.php?id=BOE-A-2017-9748 Accessed 20 September 2019.
31. Valdés I. La profilaxis del VIH empezará a dispensarse en Madrid este diciembre [HIV prophylaxis starts to be offered in Madrid this December]. *El País*. 5 December 2019 [Spanish]. https://elpais.com/ccaa/2019/12/04/madrid/1575450059_890719.html. Accessed 15 December 2019.
32. Ministerial Decree DH8S/GPO/130648/2009. Joint Decision of the Ministries of Economy, Development, and Health and Social Solidarity. *ΦΕΚ [Government Gazette]* 2198/B/2-10-2009. 2 October 2009 [Greek]. <https://www.e-nomothesia.gr/kat-ygeia/farmakeia/ya-du8d-gpoik-130648-2009.html> Accessed 20 September 2019.
33. Real Decreto 1083/2017, de 29 de diciembre [Royal Decree No. 1083/2017 of 29 December 2017]. *Boletín Oficial del Estado [Government Gazette]*, No. 317; Section I. 30 December 2017 [Spanish]. <https://www.boe.es/eli/es/rd/2017/12/29/1083> Accessed 20 September 2019.
34. Plaza AM. El test del VIH llega a las farmacias sin prescripción médica: preguntas y respuestas claves [HIV test comes to pharmacies without medical prescription: key Q&A]. *RTVE*. 22 January 2018 [Spanish]. <http://www.rtve.es/noticias/20180123/test-del-vih-llega-farmacias-sin-prescripcion-medica-preguntas-respuestas-claves/1665800.shtml> Accessed 20 September 2019.

35. Decreto-Lei No. 79/2018 [Decree-Law No. 79/2018], of 15 October 2018. Allows the direct provision to the public of devices for HIV, HCV and HBV self-testing. *Diário da República [Government Gazette]* No. 198, Serie I. 15 October 2018. [Portuguese]. <https://dre.pt/application/conteudo/116673879> Accessed 20 September 2019.
36. Augusto GF. HIV self-testing kits enjoy successful launch in Portugal. *Lancet Infect Dis.* 2019;19(12):1289. DOI: [http://doi.org/10.1016/S1473-3099\(19\)30643-7](http://doi.org/10.1016/S1473-3099(19)30643-7)
37. Gountas I, Sypsa V, Papatheodoridis G, *et al.* A hepatitis C outbreak preceded the HIV outbreak among persons who inject drugs in Athens, Greece: Insights from a mathematical modelling study. *Viral Hepat.* 2019;26(11):1311-1317. DOI: <http://doi.org/10.1111/jvh.13178>
38. Nikolopoulos GK, Sypsa V, Bonovas S, *et al.* Big Events in Greece and HIV Infection Among People Who Inject Drugs. *Subst Use Misuse.* 2015;50(7):825–838. DOI: <http://doi.org/10.3109/10826084.2015.978659>
39. Sypsa V, Psychogiou M, Paraskevis D, *et al.* Rapid Decline in HIV Incidence Among Persons Who Inject Drugs During a Fast-Track Combination Prevention Program After an HIV Outbreak in Athens. *J Infect Dis.* 2017;215(10):1496–1505. DOI: <http://doi.org/10.1093/infdis/jix100>
40. Nwokolo N, Hill A, McOwan A, Pozniak A. Rapidly declining HIV infection in MSM in central London. *Lancet HIV.* 2017;4(11):e482-e483 DOI: [https://doi.org/10.1016/S2352-3018\(17\)30181-9](https://doi.org/10.1016/S2352-3018(17)30181-9)
41. Grulich AE, Guy R, Amin J, Jin F, Selvey C, Holden J, *et al.* Population-level effectiveness of rapid, targeted, high-coverage roll-out of HIV pre-exposure prophylaxis in men who have sex with men: the EPIC-NSW prospective cohort study. *Lancet HIV.* 2018;5(11):e629-e37. DOI: [https://doi.org/10.1016/S2352-3018\(18\)30215-7](https://doi.org/10.1016/S2352-3018(18)30215-7)
42. Sullivan P, Smith DK, Mera-Giler R, Siddiqi A, Gunnels B, Harris N, *et al.* *The impact of pre-exposure prophylaxis with TDF/FTC on HIV diagnoses, 2012-2016,*

2. RESULTS

United States. 22nd International AIDS Conference, Abstract LBPEC036, 2018.
<https://programme.aids2018.org/Abstract/Print/?abstractid=13004> Accessed 20
September 2019.

3. GENERAL DISCUSSION AND CONCLUSIONS

3.1. General Discussion

The current global HIV response aims to mobilise countries worldwide to meet specific targets in testing, prevention and treatment. By 2020, UNAIDS calls for countries to have 90% of all people living with HIV (PLHIV) diagnosed, to have 90% of those diagnosed receiving antiretroviral treatment (ART) and to have 90% of those receiving ART virally suppressed [1]. Simultaneously, countries must adopt innovative strategies to tackle HIV infection, including pre-exposure prophylaxis (PrEP). Those efforts demand sound national policies, that are able to reach those most-at-risk, as well as adequate and sustained funding, in order to meet the goal set for 2030: end AIDS. This unprecedented global commitment to meet these targets was launched in the aftermath of a severe global financial crisis, that forced many countries to reduce health care spending.

The global financial crisis hit particularly Eurozone countries, which were in a limited position of facing such macroeconomic and financial shocks. Additionally, some countries accumulated imbalances and fragilities (*eg* low growth rates, high government deficit, high public debt) that made them exceptionally vulnerable when the turmoil of the crisis engulfed Europe [2]. The EU's response to countries struggling to finance their economies in financial markets was the creation of mechanisms of financial assistance. Five Eurozone countries (Greece, Ireland, Portugal, Spain and Cyprus) received bailouts from the European Union, European Central Bank and International Monetary Fund. Those financial rescue programmes were coupled with severe austerity measures that were aimed at containing costs and increase revenue in order to readjust countries' imbalances. The effect of those austerity measures on population health and on countries' health systems has been subject of research but also intense debate [3,4].

This study aimed to analyse the potential effects of those financial constraints on HIV response and national policies in Portugal, placing the country in the context of other Southern European countries that received bailout programmes. This section provides a comprehensive discussion of the findings from each study.

3. GENERAL DISCUSSION AND CONCLUSIONS

3.1.1. Provision of hospital care to PLHIV

The analysis of HIV/AIDS patients length of stay (LOS) between 2009 and 2014 found a significant decrease in LOS. A number of variables, including urgent admission, in-hospital mortality, pneumocystis pneumonia, hepatitis C, and the hospital's current ratio contributed to the decrease of LOS in HIV/AIDS patients in Portuguese hospitals [5]. The inclusion of a dummy variable to capture the implementation of the financial assistance programme and its effect on LOS allowed no definitive conclusion. In fact, the year dummies remained statistically significant, even after introducing the variable measuring hospitals' current status. The fact that the annual decrease in LOS for HIV/AIDS patients was not explained by the hospitals' current status, suggests a generalized pressure to reduce costs not fully related with the hospitals' financial situation. In fact, as public hospitals were facing a severe financial situation, a number of cost-containment measures aimed at increasing efficiency in the health sector were implemented in the scope of the financial assistance. The Memorandum of Understanding (MoU) established the reduction of hospitals' operating costs as a priority [6,7], which is the reason why hospitals belonging to the Portuguese National Health Service (NHS) were under continuous pressure to cut costs during the period of the adjustment programme. Our findings suggest that this was an important factor contributing for the decrease of LOS among HIV/AIDS patients, but there were other factors playing a role.

PLHIV were not affected by the increase of user charges in the NHS that took place in 2012, following the financial assistance programme [8]. This increase was coupled with a review of exemption rules, and PLHIV, as chronic patients in need of frequent healthcare, were excluded of paying user charges for their follow-up at the NHS [9]. The provision of antiretroviral treatment (ART) to all PLHIV continued to be free, even if anecdotal evidence suggests that some hospital were running out of ART or were rationing drugs [10,11]. Currently, delays in ART dispensing in Portugal seem to be still a reality [12,13].

Although our findings do not allow to draw any conclusion on the decreasing of quality of health care provided to HIV/AIDS patients in Portuguese hospitals, evidence from Greece and Spain suggests a deterioration in the quality of publicly provided health care [14,15].

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Despite the intense debate on the austerity measures implemented in the health sector in Portugal, most of them did not affect access to services, but instead targeted the system's costs [7]. Due to chronic management problems and persistent inefficiencies, several measures in the MoU aimed to increase savings and make the Portuguese NHS more efficient [7,16]. Cuts in salaries of public servants, including all NHS personnel, also helped to contain costs during the adjustment programme. The decreasing LOS in HIV/AIDS patients found in our analysis illustrates the pressure on public hospitals to cut costs during the period of the bailout. However, overall, austerity measures did not affect HIV/AIDS patients' access to public provided health care, although some problems with ART dispensing were (and still are) reported.

3.1.2. HIV response

The reform operated in the Portuguese HIV/AIDS Programme in 2012 coincided with the implementation of the MoU in the scope of the financial assistance programme to Portugal. The body responsible for coordinating HIV response in Portugal was created in the mid-1980s and its relevance increased as the epidemics spread in the country, during the 1990s. The main purpose of this reform was to reorganise a set of public health programmes, while reducing costs and increase their efficiency. Findings from this study show a transitory period of budgetary cuts in the National Programme for HIV/AIDS Infection, that coincided with the peak of the crisis (2012-13).

Firstly, the amounts available for funding non-for-profit organisations were cut: very far from the EUR 9.4 million available in 2008, currently the amounts available for funding community projects are approximately EUR 3 million. Spending in the syringe exchange programme, HIV rapid testing and preventive materials (male and female condoms, and lubricant) was also cut until 2013. From 2014 onwards, spending in all those core prevention programmes started to increase.

However, the most important finding from this analysis is the pivotal role played by non-governmental organisations/community-based organisations (NGOs/CBOs) in the country's HIV response. In fact, findings from this study show a smart move from the HIV/AIDS Programme by specifically including the provision of HIV testing (as well as other sexually transmitted infections) in the terms of reference of projects funded by the

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Programme. Hence, HIV testing was remarkably expanded from 2013 onwards, as those organisations provide proximity services, particularly near key populations. This was a decisive step to meet the first 90 of the UNAIDS targets: have 90% of all PLHIV diagnosed [1].

Fundamentally, the current global health agenda for HIV/AIDS is focused in closing three major gaps. The first one is the prevention gap: innovative tools such as PrEP should be part of multicomponent interventions to prevent new HIV infections. The second gap is the diagnosis gap: again, interventions to expand HIV diagnosis should include wide availability of rapid diagnostic services, community-based HIV testing as well as innovative approaches such as HIV self-testing and assisted voluntary partner notification. Finally, the third gap is the treatment gap: rapid linkage and retainment in quality HIV treatment and care is crucial to ensure that PLHIV are receiving ART and are virally suppressed, therefore not transmitting HIV. Closing those three gaps is a challenging and dynamic process that demands enabling policies, appropriate funding and regular monitoring.

A number of policies help to explain the path of Portugal in reducing its HIV epidemics. In fact, in 1993 the country started the Syringe Exchange Programme in partnership with community pharmacies, wholesales and municipalities [17]. This harm-reduction programme aimed at reducing new HIV infections among people who inject drugs (PWID), as HIV infections were mainly associated to injecting drug use. Additionally, the country enacted a progressive drug policy, including the decriminalisation of all personal drug use in 2001, moving the focus from criminal justice to a public health approach [18]. When pharmacies cancelled the agreement with the HIV/AIDS Programme in the end of 2012, this important programme was immediately transferred to Public Health Units at primary health care, so that the service of needle exchange would not be interrupted. Community-based organisations also operated the distribution of syringe kits, including night schedules, in the areas where they were most needed. As a result, there was no increase in the number of new HIV diagnosis among PWID during these years.

The engagement with civil society organisations is a key element of the Portuguese HIV/AIDS Programme that is pivotal to explain the success of HIV policies in the

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country. During the peak of the economic crisis, which coincided with the reform of the HIV/AIDS Programme, civil society organisations assured the distribution of preventive materials, provision of HIV testing services and kept their community-based projects running, despite facing financial constraints.

3.1.3. HIV epidemics

The analysis of national surveillance data on HIV cases in Portugal between 2005 and 2017 showed a significant decrease in the number of HIV diagnoses attributed to heterosexual transmission and injecting drug use both in native and foreign-born people. In contrast, the number of HIV cases in both native and foreign-born men who have sex with men (MSM) showed a non-significant increasing trend. This finding needs to be interpreted in the scope of the expansion of HIV testing targeting MSM that occurred after 2011. Only further research will allow to conclude if this finding shows an increased HIV transmission among MSM or is an artefact due to HIV testing services.

However, MSM are diagnosed earlier than any other group. In contrast, high proportions of people infected heterosexually, particularly native-born men, are diagnosed in older age. Late HIV diagnosis is still common in Portugal, with more than half of the cases where a CD4⁺ T-cell count/mm³ at HIV diagnosis was reported, being diagnosed below 350 cells/mm³. This proportion is particularly high among native and foreign-born men infected by heterosexual route. In fact, median CD4⁺ T-cell count/mm³ was the highest among younger cases and the lowest among older cases.

Heterosexual sex remains the predominant mode of HIV transmission in Portugal and prevention strategies need to focus on older age heterosexuals in order to keep effectively reducing new HIV diagnosis in the country. The recent implementation of HIV self-testing in Portugal as well as the provision of HIV rapid testing in community pharmacies are expected to make HIV testing more available for this group [19,20].

The proportion of foreign-born individuals who have acquired HIV infection outside Portugal is still relevant, as it is the proportion of native-born men infected heterosexually who have acquired HIV abroad. The close ties between Portugal and its former colonies is evident, with Portuguese African speaking countries being the most probable place of

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HIV infection for foreign-born men and women; Brazil stands as the most probable country of HIV infection for foreign-born MSM.

The trends observed in this analysis confirm two important achievements of HIV policies in Portugal. The first one is the success of prevention interventions is significantly declining new HIV diagnoses in the past twenty years. The second one is the remarkable expansion of HIV testing, that is crucial to confirm the reduction of new HIV cases in the country. Years ago, HIV rapid testing was mainly concentrated in HIV testing and counselling centres, but it became increasingly available, through public funds, at community-based organisations, primary health care units, pharmacies and laboratories. Simultaneously, HIV testing was made mandatory for antenatal care, which was crucial for early diagnosing many HIV cases and eliminating of mother-to-child transmission in Portugal [21]. Finally, doctors were encouraged to prescribe HIV tests to their patients and appropriate guidance was issued for that purpose [22]. Although the number of HIV tests requested at public primary health care centre decreased between 2010 and 2013, probably due to pressure to reduce costs during the crisis, it shows an increasing trend between 2013 and 2017, with Portugal recording a rate of 24.3 HIV tests per 1,000 population in 2017 (excluding HIV tests requested in hospitals, private sector, testing of blood donors and unlinked anonymous testing) [23].

3.1.4. HIV policies in context

When comparing Portugal to other Southern European countries that received economic assistance programmes, findings put the country in an outstanding position. The declining trends in new HIV diagnoses observed in Portugal and Spain contrast with increasing new HIV cases in Greece and Cyprus. While in Greece there was an HIV outbreak among PWID, which was linked to cuts in prevention programmes, in Cyprus the increase in new HIV diagnoses among MSM exposes the lack of an effective HIV response targeting key populations. Despite halving the number of new HIV diagnoses in just one decade, Portugal still recorded the highest HIV incidence rate among the four countries, as of 2017.

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All countries have adopted the WHO recommendation of initiating ART to all people diagnosed with HIV irrespective of their CD4 count, but the pace of increasing the number of PLHIV receiving ART was different across the analysed countries. In fact, by 2016, Greece had not yet met any of the UNAIDS 90-90-90 targets, while in the same year both Spain and Portugal had achieved two of the three targets set by UNAIDS. In 2016, Spain was missing the first 90 (to have 90% of PLHIV knowing their status) and Portugal was missing the second 90 (to have 90% of diagnosed PLHIV receiving ART). By the end of 2017, Portugal met all the UNAIDS targets for HIV treatment, three years ahead of the 2020 deadline.

Findings from this study also show that, among the four selected countries, Portugal was the only one who had implemented both PrEP and HIVST nationally. By 2019, Spain had also implemented HIVST but the country had not yet been successful in implementing PrEP nationally. Greece is still developing its HIVST policy and PrEP is part of the country's strategic plan for HIV/AIDS. Finally, Cyprus was the only one, among the four selected countries, with no policy on PrEP or HIVST.

The reason why Portugal stands out among the Southern European countries that received assistance programmes during the financial crisis (and even in the context of the EU) lays on several reasons. Firstly, the country has shown a strong commitment to mounting a strong HIV response since the emergence of the epidemic in the 1980s. The prioritisation of HIV in health policies in Portugal has been consistent across all political and economic cycles. Secondly, the Portuguese National Health Service was a pivotal element in the country's HIV response. Portugal has always provided free HIV treatment and care, to all people eligible to start ART, including undocumented migrants. The eligibility to start ART changed across the years, until the adoption, in 2015, of the WHO recommendation of initiating ART to all people diagnosed with HIV, irrespective of their clinical stage/CD4 count. Thirdly, the Portuguese HIV/AIDS Programme has been a crucial stakeholder in coordinating the country's HIV response, by involving reputed national experts and engaging with civil society. The implementation of a evidence-based and people-centred HIV response made it possible to achieve important reductions in the HIV epidemic in a very short time. Fourthly, the development of a strong HIV response among civil society organisations was crucial to expand HIV prevention and diagnosis and reach

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those most-at-risk effectively. Lastly, Portugal has operated important improvements in its HIV surveillance. HIV/AIDS became a mandatory notifiable disease, an electronic notification system was implemented, and a constant monitoring of reported cases is carried out jointly by the HIV/AIDS Programme and the National Institute of Health.

3.1.5. Limitations

This study has a number of limitations. To analyse the potential effects of austerity measures adopted in the scope of a financial crisis on a country's HIV policy is difficult, complex and potentially biased [24]. In fact, the lack of measures to monitor the impact of crisis on health systems and on population health makes it difficult to measure the effects of austerity policies implemented. It would be misleading and methodologically wrong to establish causality between austerity measures and specific health or policy outcomes, although a number of studies have made those associations [25-30]. The understanding of a country's policy process and health prioritisation is a very complex and difficult task that must consider several factors left aside of this study.

Another methodological limitation of this study was the use of national secondary data to conduct analysis. This research would have benefited of a qualitative approach that could have add insight of important stakeholders on the findings of this study.

Important elements of HIV policy were left aside of this research. One of them is the price of ART in Portugal and how generics have lowered that price. The important pharmaceutical reform carried out during the assistance programme has encouraged the introduction of generic drugs both on ambulatory and on hospital care as a way to produce savings to the health system. In fact, in 2018 Portugal saved around EUR 15.8 million (-7.4%) on antiretroviral drugs for HIV, comparing to 2017 [31]. However, the total amount spent in 2018 (EUR 199 million) falls well behind the EUR 230 million the country spent on ART in 2012 [32].

Also, the analysis of HIV/AIDS patients' length of stay did not allow to draw conclusion on the increase or decrease of the health care provided in Portuguese hospitals during the implementation of the economic assistance programme.

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Finally, the lack of comprehensive data from other countries that received financial assistance and the imperfect knowledge on the effects of austerity measures on their health systems and national HIV policies prevented a more informed comparative analysis between Portugal and other bailed out Southern European countries.

3.1.6. Policy implications

This study aimed to analyse the role played by the austerity measures implemented in the context of the economic and financial assistance programme in Portugal on the country's HIV response and national HIV policies. Findings from this research are expected to contribute to the literature on this issue but also to draw policy implications that can guide decision makers in future economic downturns. Results from this study are therefore an important contribution to the knowledge and understanding of Portugal's HIV policy under financial constraints and are useful to characterise the country's progress towards AIDS elimination.

A number of policy implications can be outlined from the results of this study. Findings from this research suggest that the implementation of austerity measures in Portugal may have influenced transitory cuts in the budget of the national HIV/AIDS Programme. The prioritisation of available resources and the strong engagement with civil society organisations were pivotal to maintain a sustained and effective provision of HIV prevention programmes. However, it is important for policy makers to understand when increasing efficiency gives place to flaws in HIV response. Spending in HIV prevention must be oriented towards the implementation of evidence-based and people-centred approaches, and the role of civil society organisations seems to be crucial to the success of the Portuguese HIV response. Decision makers should be informed of potential step backs in national HIV response if further budgetary adjustments are to be considered.

The significant decrease of new HIV cases in Portugal observed in recent years is the result of several policies implemented, including harm-reductions programmes, expansion of HIV prevention and accessible HIV rapid testing. However, results from this study show that foreign-born individuals, most of them migrants, account for approximately 30% of new HIV cases in Portugal, most of them indicating Portugal as the country where HIV infection was acquired. These findings highlight the need for effective interventions targeting this

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vulnerable population, eliminating existing barriers to health care [33]. Also, the relevant percentage of cases who are late diagnosed calls for urgent actions to successfully reach older age groups, particularly native and foreign-born men infected heterosexually.

Finally, as Portugal is one of the countries who implemented PrEP and HIVST, it is important to expand the utilisation of these innovative approaches in order to accelerate the declining of the HIV epidemics in the country. On the one side, HIVST has the potential of reaching many individuals who do not use health services and do not primarily seek HIV testing, making it more available to them. In addition, PrEP stands a valuable preventive tool that should be available to a larger group of the population. With approximately 600 people receiving PrEP at the Portuguese National Health Service by the end of 2018 (excluding all those that buy PrEP through the internet), the number of people who access PrEP in Portugal must be dramatically expanded in order to achieve appreciable levels of coverage and, therefore, have impact on the HIV epidemics. Countries implementing PrEP should consider mechanisms of access that facilitate individuals to get PrEP as easily as possible and can maximize impact by scaling up coverage. One approach is making PrEP available in community pharmacies with a prescription with an out-of-pocket expenditure [34,35]. Such models of care have been instrumental in facilitating access in Netherlands (estimated 7,000 people taking PrEP), Poland, Ireland, Italy, Germany and Austria. Another approach entails 'de-medicalizing' PrEP, whereby PrEP can be delivered by community-based organisations. These approaches must be considered by decision makers in Portugal.

Finally, it is important to constantly monitor the implementation of these innovative strategies, as it is to strengthen HIV surveillance by taking full advantage of electronic systems implemented in the Portuguese NHS. The successful partnership established with two national bodies (the National Institute of Health and the Directorate-General of Health) for the concretisation of this study is a good example of how academia and national public health agencies can cooperate to analyse policies and produce scientific knowledge that can be translated to decision making.

3.2. Conclusions

This study analysed Portugal's HIV epidemic and national response in the context of the economic assistance programme implemented between 2011 and 2014 after the global financial crisis, and how austerity measures implemented in the country have potentially impacted in HIV policies and the country's response to the epidemic.

Despite some transitory cuts in funding in 2012-13, the HIV/AIDS Programme in Portugal was able to maintain its activities and even largely expanding not only HIV prevention interventions but HIV testing services. Portugal also shows a significant decrease in new HIV cases among native and foreign-born individuals, except in men who have sex with men. Additionally, the country has successfully implemented international recommendations on HIV treatment and has met the UNAIDS 90-90-90 targets ahead of the 2020 deadline. Portugal was also able to implement innovative approaches such as pre-exposure prophylaxis and HIV self-testing nationally. The results from this study show that financial constraints experienced in Portugal until recently have not hampered the country's progress in fulfilling its political commitments with ending the AIDS epidemic by 2030.

Our study has identified a number of reasons that explain our findings and make Portugal an interesting case study in the European context. The strong prioritisation of HIV/AIDS in the country's health policy, the response from the universal National Health Service, the engagement with civil society organisations and the adoption of evidence-based and people-centred policies are pivotal elements to explain why HIV response did not collapse when hard financial constraints were imposed to the country.

This study aimed to make an important contribution to the understanding of the potential impact of austerity measures on health policies and public health. Firstly, because the subject is original in the Portuguese and European literature on this issue; and secondly, because findings from this study can stand as a useful guidance to decision makers in future economic downturns.

Policy implications that can be outlined from the results of this study include the need of maintaining adequate funding for HIV prevention programmes, namely through the engagement with civil society organisations; the importance of implementing effective interventions relevant to migrant populations as well as older age population groups who are still late diagnosed; and the opportunity to consider the expansion of the delivery of PrEP to

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other settings, namely community pharmacies and community-based organisations, in order to take full advantage of the potential effects of this innovative tool on the HIV epidemic.

In conclusion, the implementation of the economic assistance programme had severe social and economic consequences to Portugal. However, the country's HIV response and national policies were preserved, with no detrimental consequences on the epidemic nor service provision. Portugal stands out as an example of strong engagement in tackling HIV epidemic and must take the opportunity to further reduce new HIV cases by taking full advantage of available innovative approaches implemented in the country. The adoption of evidence-based and people-centred approaches and the engagement with civil society organisations must remain as essential features of Portugal's HIV health policy.

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3.3. References

1. Joint United Nations Program on HIV/AIDS (UNAIDS). *UNAIDS Strategy 2016-2021*. Geneva: UNAIDS; 2015. http://www.unaids.org/en/resources/documents/2015/UNAIDS_PCB37_15-18
Accessed 25 September 2019.
2. Lane PR. The European sovereign debt crisis. *Journal of Economic Perspectives*. 2012; 26 (3): 49-68. DOI: <http://doi.org/10.1257/jep.26.3.49>
3. Karanikolos M, Mladovsky P, Cylus J, Thomson S, Basu S, Stuckler D, Mackenbach JP, McKee M. Financial crisis, austerity, and health in Europe. *Lancet*. 2013;381(9874):1323–1331. DOI: [http://doi.org/10.1016/S0140-6736\(13\)60102-6](http://doi.org/10.1016/S0140-6736(13)60102-6)
4. Perelman J, Felix S, Santana R. The great recession in Portugal: impact on hospital care use. *Health Policy*. 2015; 119(3): 307–315. DOI: <http://doi.org/10.1016/j.healthpol.2014.12.015>
5. Augusto GF, Dias SS, Abrantes AV, Martins MRO. HIV/AIDS length of stay in Portugal under financial constraints: a longitudinal study for public hospitals, 2009-2014. *BMC Health Serv Res*. 2019;19(1):303. DOI: <http://doi.org/10.1186/s12913-019-4131-0>
6. Portugal – Memorandum of understanding on specific economic policy conditionality, 17 May 2011. http://ec.europa.eu/economy_finance/eu_borrower/mou/2011-05-18-mou-portugal_en.pdf. Accessed 25 September 2019.
7. Simões J, Augusto GF, Fronteira I, Hernandez-Quevedo C. Portugal: Health System Review. *Health Syst Transit*. 2017; 19(2): 1-184. http://www.euro.who.int/_data/assets/pdf_file/0007/337471/HiT-Portugal.pdf?ua=1. Accessed 25 September 2019.
8. Barros PP. Health policy reform in tough times: the case of Portugal. *Health Policy*. 2012;106(1):17–22. DOI: <http://doi.org/10.1016/j.healthpol.2012.04.008>

3. GENERAL DISCUSSION AND CONCLUSIONS

9. Decreto-Lei No. 113/2011 [Decree-Law No. 113/2011], of 29 November 2011. *Diário da República [Government Gazette]* No. 229, Serie I. 29 November 2011. <https://dre.pt/application/conteudo/146061> Accessed 25 September 2019.
10. Hospitais já fazem racionamento de remédios mais caros [Hospitals are rationing the most expensive drugs]. *Público*. 28 September 2012. <https://www.publico.pt/2012/09/28/sociedade/noticia/hospitais-ja-fazem-rationamento-de-remedios-mais-caros-1564932> Accessed 25 September 2019.
11. SIDA. Associação denuncia racionamento de medicação [AIDS. Association reports medication rationing]. *i*. 17 February 2014. <https://ionline.sapo.pt/artigo/370864/sida-associacao-denuncia-rationamento-de-medicacao?seccao=Portugal> Accessed 25 September 2019.
12. Grupo de Ativistas em Tratamento denuncia falta de medicamentos antiretrovirais na Madeira [Group of Activists in Treatment reports lack of antiretrovirals in Madeira]. *Diário de Notícias Madeira*. 22 January 2016. <https://www.dnoticias.pt/hemeroteca/563736-grupo-de-ativistas-em-tratamento-denuncia-falta-de-medicamentos-anti-retr-BJDN563736> Accessed 25 September 2019
13. Maia A. Doentes com VIH no Algarve só recebem tratamento para cinco dias [HIV patients can only get medication for five days]. *Diário de Notícias*. 28 February 2017. <https://www.dn.pt/portugal/doentes-com-vih-no-algarve-so-recebem-tratamento-para-cinco-dias-5695065.htm> Accessed 25 September 2019.
14. Keramidou I, Triantafyllopoulos L. The impact of the financial crisis and austerity policies on the service quality of public hospitals in Greece. *Health Policy*. 2018; 122(4):352-358. DOI: <http://doi.org/10.1016/j.healthpol.2017.12.008>
15. Heras-Mosteiro J, Sanz-Barbero B, Otero-Garcia L. Health Care Austerity Measures in Times of Crisis: The Perspectives of Primary Health Care Physicians in Madrid, Spain. *Int J Health Serv*. 2016; 46(2): 283-99. DOI: <http://doi.org/10.1177/0020731415625251>

3. GENERAL DISCUSSION AND CONCLUSIONS

16. Barros PP. Health policy reform in tough times: the case of Portugal. *Health Policy*. 2012;106(1):17–22. DOI: <http://doi.org/10.1016/j.healthpol.2012.04.008>
17. Torre C, Lucas R, Barros H. Syringe exchange in community pharmacies – The Portuguese experience. *Int J Drug Policy*. 2010; 21(6): 514-7. DOI: <http://doi.org/10.1016/j.drugpo.2010.09.001>
18. Greenwald G. Drug Decriminalization in Portugal: Lessons for Creating Fair and Successful Drug Policies. *Cato Institute Whitepaper Series*; 2009. <http://doi.org/10.2139/ssrn.1464837>
19. Circular Normativa Conjunta [Joint Normative Document] DGS/ACSS/INFARMED/INSA/SPMS. *Provision of point of care testing for HIV, HVC and HVB in community pharmacies and in laboratories of clinical pathology/clinical tests*. 24 August 2018. <https://www.infarmed.pt/web/infarmed/entidades/dispositivos-medicos/realizacao-de-testes-rapidos> Accessed 25 September 2019.
20. Decreto-Lei No. 79/2018 [Decree-Law No. 79/2018], of 15 October 2018. Allows the direct provision to the public of devices for HIV, HCV and HBV self-testing. *Diário da República [Government Gazette]* No. 198, Serie I. 15 October 2018. [Portuguese]. <https://dre.pt/application/conteudo/116673879> Accessed 25 September 2019.
21. Directorate-General of Health. Pregnancy and Immunodeficiency Virus. *Norma No. 01/DSMIA [Normative Document No. 01/DSMIA]*. 4 February 2004. <https://www.dgs.pt/directrizes-da-dgs/normas-e-circulares-normativas/circular-normativa-n-1dsmia-de-04022004-pdf.aspx> Accessed 25 September 2019.
22. Directorate-General of Health (DGS). Diagnosis and laboratory screening of HIV Infection. *Norma No. 058/2011 [Normative Document No. 058/2011]*. 28 December 2011 updated on 10 December 2014 [Portuguese]. <https://www.dgs.pt/directrizes-da-dgs/normas-e-circulares-normativas/norma-n-0582011-de-28122011-jpg.aspx> Accessed 25 September 2019.

3. GENERAL DISCUSSION AND CONCLUSIONS

23. European Centre for Disease Prevention and Control, WHO Regional Office for Europe. *HIV/AIDS surveillance in Europe 2018 – 2017 data*. Copenhagen: WHO Regional Office for Europe; 2018. <https://ecdc.europa.eu/sites/portal/files/documents/hiv-aids-surveillance-europe-2018.pdf> Accessed 25 September 2019.
24. Parmar D, Stavropoulou C, Ioannidis JP. Health outcomes during the 2008 financial crisis in Europe: systematic literature review. *BMJ*. 2016; 354: i4588. DOI: <http://doi.org/10.1136/bmj.i4588>
25. Economou M, Madianos M, Peppou LE, Patelakis A, Stefanis CN. Major depression in the era of economic crisis: a replication of a cross-sectional study across Greece. *J Affect Disord*. 2012; 145(3): 308–314. DOI: <http://doi.org/10.1016/j.jad.2012.08.008>
26. Economou M, Madianos M, Peppou LE, Theleritis C, Patelakis A, Stefanis C. Suicidal ideation and reported suicide attempts in Greece during the economic crisis. *World Psychiatry*. 2013; 12(1): 53–59. DOI: <http://doi.org/10.1002/wps.20016>
27. Gili M, Roca M, Basu S, McKee M, Stuckler D. The mental health risks of economic crisis in Spain: evidence from primary care centres, 2006 and 2010. *Eur J Pub Health*. 2013;23(1):103–108. DOI: <http://doi.org/10.1093/eurpub/cks035>
28. Kentikelenis A, Karanikolos M, Papanicolas I, Basu S, McKee M, Stuckler D. Health effects of financial crisis: omens of a Greek tragedy. *Lancet*. 2011; 378(9801): 1457–1458. DOI: [http://doi.org/10.1016/S0140-6736\(11\)61556-0](http://doi.org/10.1016/S0140-6736(11)61556-0)
29. Zavras D, Tsiantou V, Pavi E, Mylona K, Kyriopoulos J. Impact of economic crisis and other demographic and socio-economic factors on self-rated health in Greece. *Eur J Pub Health*. 2013;23(2):206–210. DOI: <http://doi.org/10.1093/eurpub/cks143>

3. GENERAL DISCUSSION AND CONCLUSIONS

30. Vandoros S, Hessel P, Leone T, Avendano M. Have health trends worsened in Greece as a result of the financial crisis? A quasi-experimental approach. *Eur J Pub Health*. 2013;23(5):727–731. DOI: <http://doi.org/10.1093/eurpub/ckt020>
31. INFARMED – National Authority of Medicines and Health Products. *Monitoring Medicines Consumption – Hospital setting. December 2018*. Lisbon: INFARMED; 2019. <https://www.infarmed.pt/documents/15786/2682984/dezembro/9a288819-3b0e-4381-a068-5dee8c1df380?version=1.0> Accessed 25 September 2019.
32. INFARMED – National Authority of Medicines and Health Products. *Medicines Consumption in Hospital setting – Monthly monitoring.. December 2012*. Lisbon: INFARMED; 2013. https://www.infarmed.pt/documents/15786/1085034/Rel_ConsumoMedicamentos+em+Meio+Hospitalar_2012.pdf/f076a61a-5e58-4ac7-bf61-f0a298c2c112?version=1.0 Accessed 25 September 2019.
33. Dias S, Fronteira I, Gama A, Gróz AP, Mardin D, Simões J, Roxo L, Barros PP. Health Policies, Patterns and Barriers to Migrants’ Access to Primary Health Care. In: Rosano A. (Eds) *Access to Primary Care and Preventative Health Services of Migrants*. SpringerBriefs in Public Health. Springer, Cham; 2018. DOI: https://doi.org/10.1007/978-3-319-73630-3_9
34. Venter WDF. Pre-exposure Prophylaxis: The Delivery Challenge. *Front Public Health*. 2018;6:188. DOI: <http://doi.org/10.3389/fpubh.2018.00188>
35. Shaaban AN, Morais S, Peleteiro B. Healthcare Services Utilization Among Migrants in Portugal: Results From the National Health Survey 2014. *J Immigr Minor Health*. 2019;21(2):219-229. DOI: <http://doi.org/10.1007/s10903-018-0744-3>