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Reducing Disease Burden in Rural Populations: Case Studies in Europe and Africa

Paulo Henrique das Neves Martins Pires

Abstract

In 1984, Portugal was a middle-income country, developing the primary health care system, based on family doctors, health centres and health posts, reaching almost all population, with infectious diseases as one of the main health problems. In 2006, Mozambique was a low-income country, with a national health service attaining 60% of the population (40% in rural areas), with a double burden of disease (infectious and non-communicable diseases). Working in primary health care in Europe and Africa, we compare several experiences of family medicine practice in rural populations, different in context, time, and methods: Portugal 1984–2006 and Mozambique 2007–2020, all with a strong component of community health education. Our descriptive case studies, summarise strategies, interventions, and results, reviewing reports and articles. Population's health indicators, and quality of life have improved, in different contexts with culturally tailored approaches. Participative societal diagnosis and multidisciplinary interventions are necessary to improve rural population health. Different rural populations and cultures are ready to learn and to participate in health promotion; empowering rural populations on health issues is an affordable strategy to better health indicators and services. Family Medicine is effective to extend primary health care to all rural populations, aiming universal health cover.

Keywords: empowerment, family medicine, health education, Mozambique, multidisciplinary, participative, Portugal, primary health care, rural medicine

1. Introduction

Since 1978, with the Declaration of Alma-Ata issued at the International Conference on Primary Health Care (PHC), the World Health Organisation (WHO) urgently recommended to the Ministries of Health (MH) in all countries, to organise their national health systems (NHSs) into two levels to protect and promote the health of all people of the world. First universal PHC services covering all populations in all territories, and then a secondary level of health care for more specialised interventions.

PHC was then defined as “essential health care based on practical, scientifically sound and socially acceptable methods and technology, made universally accessible to individuals and families in the community, through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination”.

To attain the human right “health for all”, WHO’s member nations committed their governments to accept PHC as national policy [1].

In 2018, in commemoration of the 40th anniversary of Alma Ata, the Global Conference on Primary Health Care formulated the Astana Declaration on PHC, emphasising that “Strengthening PHC is the most inclusive, effective, and efficient approach to enhance people’s physical and mental health, as well as social well-being, and that PHC is a cornerstone of a sustainable health system for universal health coverage (UHC) and the health-related Sustainable Development Goals (SDGs)” [2]. In 2019 WHO recommended that member countries’ governments harness new funds to achieve these goals [3].

As a medical doctor, our professional, politic, and philosophic perspective, since university, has been to work with low-income populations in rural areas, those with less access to health care services. This has been our foundation throughout 36 years of practice, in many different contexts in Europe, Asia, and Africa. Our practice included a strong component of individual and community health education using a holistic approach to improve population health and reduce health disparities [4].

This chapter summarises different interventions attempting to reduce disease burden in rural populations, comparing methods and health results from distinct cases.

2. Portugal, 1984–2006

2.1 Background

In 1984, 10 years after the revolution (24 April 1974), the recently created NHS was expanding to cover all provinces and populations, even in isolated rural areas, developing the PHC system, based on family doctors, health centres and health posts. There were around 28000 medical doctors for 10 million inhabitants (average 1/357), but the majority was working in cities, many in private clinics, and family doctors were a small minority.

Portugal was a middle-income country, where infectious, contagious, and parasite diseases were the main problems. Coming out of 40 years of dictatorship, the rural population had no access to public health services, was poorly educated, and had little information regarding hygiene and nutrition. Since the creation of the NHS, the country has made impressive progress in health indicators, such as reducing infant mortality and increasing life expectancy by four years to 81.3 years (longer than the European Union average).

Montalegre administrative division (806 Km²), in the northern Portuguese region of Barroso, Trás-os-Montes province, on the frontier with Galicia (Spain), was a markedly isolated area, in the mountains, with one health centre (built in 1985) and nine decentralised health posts, covering around 30.000 people living in 35 villages. Ambient temperature ranges from negative 10 °C in winter to 38 °C in the summer. There were no industries, and the main activities were subsistence agriculture, cattle breeding, and forestry. Family houses had no running water, no indoor toilet or bathrooms, no sanitation and electricity had arrived only one year before in 1983. There was no public transportation, few roads and low accessibility to products and services.

We started working in Montalegre as a private General Practice physician and received family medicine (FM) speciality in the NHS from the Portuguese MH Institute of General Practice after four years. We worked at Montalegre’s Health Centre (MHC), and at two other health posts, assisting an average of 577 families (1927 persons), in Cabril and Salto villages; emergency room coverage and wards rounds were done weekly, assisting a population around 14.000 persons at MHC.

2.2 Methods

During the last two years of our medical training at Louvain Catholic University, in Brussels, Belgium, with the help of professors in the disciplines of Tropical Medicine and Public Health, we developed a base line study about health issues in the Cabril administrative division, a mountain area in the Penêda-Gerês National Park (PGNP). The survey identified the main population health problems, high maternal mortality (with 92% of home deliveries) and child mortality (89 deaths per 1000 births), alcohol abuse (86% consumers with 31% abuse), and high prevalence of arthrosis (25%) in the older population. We then developed an implementation research project, aimed at improving these health indicators. The project included activities in health education and support, adolescent, and youth cultural and sport activities, and agricultural diversification to improve family income.

2.2.1 Health education and support

- Daily practice: preventive medicine, diagnosis, treatment, rehabilitation, health education and promotion of healthy behaviours.
- Implementation research: clinical and community health research, evaluation, and program interventions and adaptations.
- Community health education programmes: interventions with local authorities to furnish running water; promote sanitation and organize a rubbish collection and treatment system; interventions with school boards to organize health fairs and student health extension activities in the villages; weekly radio broadcast on local health issues.
- Alcohol abuse prevention programme: systematic screening and behavioural counselling; [5] focus group discussions with the families in the villages, with adolescents, pregnant women, and men, and in schools (primary and secondary) with pupils and teachers, male, and female.

2.2.2 Adolescent and youth cultural and sport activities

- A Cabril Youth Cultural and Sportive Association was established. This new institution edited and distributed a monthly newspaper in 17 villages, organized a small library and history museum, and produced a one-hour film about the history of the region.
- Local screening of films along with debates, photography expositions, football championships, and swimming competitions, were implemented in the villages.
- Theatre groups were trained and performed in primary and secondary schools.

2.2.3 Family agricultural diversification

- Honey production was a traditional activity in most families (2 kg/year/ beehive). With the PGNP support, we trained farmers on modern beekeeping. Within the cooperative equipment was acquired and distributed. One year after, farmers were collecting 25 kg/year/hive).

- All families bread some cattle (average 2 cows, 3 pigs, 8 goats, 10 chicken). The local typical horse known as “*Garrano do Gerês*” had almost disappeared. We looked farther afield to find some female and male horses of this type and brought them to Cabril. We began breeding them to spend half of the year in the village (Autumn and Winter), and the other six months free in the mountain of Gerês, with weekly surveillance. Interaction with veterinary authorities led to the classification of the horses as a species threatened with extinction, and so the Ministry of Agriculture paid a yearly subsidy per animal to farmers. This increased the number of local breeders and produced a new source of family income.
- The magnificent landscape of PGNP (the only national park in Portugal), was perfect for developing tourism. The unpolluted environment boasts vast lakes of quiet clear water, a wide ecological diversity including eagles, wolfs, snakes, fish, medicinal plants, and alpine vegetation. There are several large dams providing hydroelectric power. The rich cultural heritage of the area was on display. There are ruins from the middle-ages, sacred religious monuments, and scattered granite sculptures. Story tellers, popular games, traditional theatre, and local wool and linen producers abound. Given all this it was decided to develop an eco-tourism cooperative. *TG – Trote Gerês, cooperativa de ocupação de tempos livres, crl*, built a camping-site, an hippic centre, and organised different tours, with small groups, either by foot, horse and occasionally with the support of a van. Later other lodging and restaurant services were begun employing 50 workers of local families.

2.3 Results

- Endemic outbreaks of tuberculosis, brucellosis, and rickettsia were stopped.
- Family planning and contraception was used by 90% of women between 15–50 years of age.
- By building a trusting and ongoing relationship with families, we saw all pregnant women went attending ante-natal visits and delivering at the maternity unit. All children were followed through family medicine visits, and the child mortality rate was zero in 2001 (**Table 1**). Maternal mortality (3.3 deaths/1000 livebirths) approached zero in 2006 [6].
- Alcohol abuse behaviours diminished, notably in pregnant women.
- Arthrosis was prevented with health education on weight carrying and viral infections prevention and treated with local medicinal plants.
- The emphasis on the region’s typical culture and environmental quality increased population’ self-esteem and attracted many visitors.
- Diversification of economic activities resulted in increased family income, along with better nutrition, housing and child and adolescent education.

Child mortality rates Year	1981	1996	2001
Deaths of children <1 year/1.000 live births	18.1	10.5	0

Table 1.
Child mortality rate in Montalegre, Portugal, 1981–2001.

2.4 Conclusion

This was our contribution to improve health indicators in the rural communities of Cabril and Salto, Montalegre. We saved lives of mothers and children. At only a small increase in health costs we significantly raised the population's quality of life.

But we observed a quick penetration of the modern consumer society model into the area. In came roads, money, television, and returning emigrants. The new NHS was tailored to the treatment of the infectious diseases burden and the hierarchy was resistant to adaptations or innovations. With this change in lifestyle, non-communicable diseases such as hypertension, obesity, diabetes, became prominent in this population, and there was not an efficient response from the NHS.

Between 2000 and 2017, the country reduced public health expenditure, thus preventing modernization of services. Private medical care was increased contributing to a loss of the public medical workforce. The NHS no longer meets the needs of a substantial part of the population [7].

3. Mozambique, 2007–2020

3.1 Background

Mozambique is a low-income country (gross domestic product - GDP per Capita 458 USD), [8] with a NHS reaching only 60% of the population (40% in rural areas), with a double burden of disease (infectious-contagious and non-communicable diseases, NCDs). In 2007, Mozambique had a high birth and fertility rate (42 births / 1000 inhabitants and 5.7 pregnancies /women, respectively), high maternal mortality rate (500 deaths / 100000 live births) and high child mortality rate (94 deaths/1000 live births), with an average life expectancy of only 51 years. The population was growing at 2.5% /year. To face these critical situations, the MH has been developing a country wide information and education campaign in health promotion [9]. They are targeting malaria prevention, maternal and child health, tuberculosis, and human immunodeficiency virus (HIV) infection.

The country has several ethnic groups, with over 10 languages and 30 dialects, though the population speaking the official language (Portuguese) is only around 30%; 50% have no school education. Most of the population live in rural areas (70%), with low access to media (10% with television, 50% with radio, 2% with internet). Running water reaches 34% of family homes, sanitation 46% and electricity 10%. Population density is low (25.3 inhabitants/Km²), and 47% has less than 14 years of age; 56% are Christian and 18% Islamic.

In 2020 there were only around 4000 physicians for 30 million inhabitants (average 1/7500), but half of them practice in the capital (Maputo) and in the country's biggest city near-by (Matola). Many districts with more than 100000 inhabitants have only one doctor, and the PHC system depends almost exclusively on medical technicians and nurses with just three years of training.

3.2 Methods

PHC Mozambican interventions followed three phases.

The first (2006–2007), in a rural area of Matola district, in the South, was implemented as a health promotion campaign. Most of these families had little formal education, no regular employment income, and were living from subsistence agriculture and informal small business. During 2006–2007, in association with a local non-governmental association (NGO), ADEL Maputo, a local economic

development association, funded by the Galician Government (Spain), we used a participatory action approach with the community to get an idea of what health issues were present. We then built, equipped, and furnished the consumables for the first Health Promotion Centre in Mozambique. It had a water reservoir, meeting room, two offices, and WC.

Then we trained a group of 50 adolescent and youth boys and girls, in basic health research. This included design and application of questionnaires, along with management of health promotion and disease prevention activities. The activities included hygiene, nutrition, food security, fruit trees culture, and sexual transmitted infections (STIs). This group implemented an information and screening campaign on the street. It included malaria, HIV, malnutrition, obesity, hypertension, diabetes, and STIs. They visited families delivering health promotion key messages and gave five fruit trees (three rich in calories, two rich in vitamins and minerals) to each of 1075 families, in the rural area of *Zona Verde* (Green Zone). At the same time a media campaign was developed and broadcast online (global), on radio, on TV, and in newspapers (regional and national). Locally they distributed banners and leaflets. Key messages were adapted to different target populations such as children, adolescents, youth, adult men and women, seniors, and elders. Local public authorities and companies (private and cooperative) were project partners. They cooperated in health key messages diffusion. The MH started a health post at the Health Promotion Centre.

The second phase from 2007–2010 was in the 16 rural districts of Zambézia province, in central Mozambique. It aimed to reduce HIV incidence through expansion of antiretroviral treatment (HAART). This intervention was an initiative of the Vanderbilt University Institute for Global Health (Nashville, USA) funded by the President's Emergency Plan for Acquired Immunodeficiency syndrome (AIDS) Relief (PEPFAR). Working initially as a family doctor consultant, later as a clinical site coordinator and district clinic advisor, and ultimately as a clinical program manager, we contributed to the design of a base line study, which surveyed the health facilities, the health professionals (HPs), and reviewed some of NHS data. Subsequently, an implementation plan was designed. It targeted primary HIV prevention, testing, patient's treatment (expanding HAART) and follow-up. It also included up-grading health facilities and laboratory support, training of HPs and research. Team building for project's field implementation was multicultural and interdisciplinary. Activities were varied:

- AIDS and HIV literature review, cultural research, summary of national official and social impact and response to HIV.
- Research and discussion on methods and strategies for health systems and program development.
- Establishing partnerships and coordinating with the MH, local administration, and international NGO's.
- Health infrastructure and laboratory planning, development, implementation, and evaluation.
- Design of teaching tools for health workers in PHC and health promotion.
- Constitution of a new local NGO (FGH, Friends in Global Health, LLC), modeling appropriate team management, evaluation tools, social interventions, partnerships, communication, information systems, and community mobilization.

- Planning, coordination, implementation and evaluation of the participatory action derived community information and operational research done in community health. We stressed use of evidence-based medicine, family epidemiology, and various types of sampling methods.
- Planning, coordination and evaluation of health and health promotion education programs, including resources preparation, identification of sources, institutional partnerships, economic management, action plans and reports, risk assessment.
- Planning and execution of training activities for HPs on HIV/AIDS/HAART/opportunistic infections (OI), principles of FM, prevention of mother to child transmission (PMTCT), volunteer counselling and testing (VCT), tuberculosis (TB) and STIs, including counselling and therapeutic adherence.
- Counselling in health care systems management and development and HAART expansion techniques was given to AIDS care in six rural Zambebian under resourced districts. This was done in partnership with MH, local administration as well as local, national, and international NGO's. The initial target population was 1250000 patients, later in 12 districts with a target population of 2350000 and most recently in 18 health centres.

The third phase (2011–2020), was in Lúrio University (UniLúrio), Nampula province in northern Mozambique. It was aimed at implementing a FM residency training program and improving health extension in peri-urban and rural populations. The Faculty of Health Sciences (FHS) is the oldest (14 years) and bigger faculty in this public university, and the board recognised the need to broadly implement the PHC system with family doctors, to change the country health paradigm towards UHC. As assistant lecturer at UniLúrio we developed several activities:

- Preparation and proposal approved for the specialisation of Mozambique general practitioners in Family and Community Medicine by Mozambican Medical College and the MH.
- Development of proposals for curriculum in Community Health and Scientific Research Methodology.
- Development of the One Student One Family Program (1-EF) for all the FHS courses (Medicine, Dentistry, Pharmacy, Nutrition, Nursing, Optometry), and organising a medical records database system. This program links every new student entering the FHS (200/year), to a family living in rural Natikiri (around the Campus). The student will visit periodically during a full term, and every term right from the first year, for health education extension and occasional referrals of acute or chronic cases to the NHS.
- Training of FHS lecturers and students in operational and implementation research methods, and bioethics.
- Health emergencies strategies (human and natural catastrophes) design and training for private initiative, students, and lecturers.
- Faculty board counselling, pedagogic assessment and development, quality assessment and development, member of evaluation boards (candidate lecturers, Nutrition, Optometry and Pharmacy degrees).

- Lecturing on Family and Community Medicine concepts to the 2nd, 4th and 5th year of Medicine students and overseeing rural medical internships (6th year). (Note that students enter the Medical degree program directly from high school).
- Planning and execution of operational and implementation research (Maternal and child health, Hansen disease, tuberculosis, cholera, HIV, mental health).
- FHS Scientific Committee work which included development and implementation of a research policy, reviewing lecturers' and students' research protocols and manuscripts.

3.3 Results

Health promotion and education of rural populations was achieved on the three phases, but at different locations and times, using different methods, producing several outputs. Below is a summary of the main results.

3.3.1 Phase 1

- 10000 persons were interviewed, screened, and given the health promotion key messages: 24% were positive for malaria, 16% had dermatologic diseases, 13% were positive for HIV, 10% had cholera, 8% TB, 8% hypertension, 7% diarrhoea, 4% STI and 4% arthrosis. Those with these issues were informed about specific prevention activities, about treatment methods, and referred to the NHS services.
- Using the local language, 2121 participants in community health extension activities, were reached in 37 interventions (27 local communities, 6 primary schools, 3 markets, 1 pre-school nursery).
- 1075 rural families received, planted, and farmed 5375 fruit trees in their courtyards, serving around 6000 people.
- The first Health Promotion Centre in Mozambique was built, equipped, and staffed with a trained team and in cooperation with MH, a new health post for disease screening and reference to NHS was launched.

3.3.2 Phase 2

Health infrastructure evaluation and development in 36 health centres and hospitals in 16 rural districts of Zambézia, providing water, power, installation of prefabricated health units and laboratory equipment [10].

The working team in the 16 districts reached 263 people, supporting their families (1315 persons), and innovating with three new positions in the NHS: social assistant, case manager, data manager.

HPs trainings on HIV, counselling, TB, PMTCT, OI reached 350 NHS workers and 210 HP students.

Patient followed with a positive HIV result increased from 9000 to 46000, and those on HAART increased from 3000 to 8000 (**Table 2**).

Testing pregnant women for HIV to prevent mother to child transmission (PMTCT) increased from 2000 to 60000 thousand, and their HIV prevalence reduced 8% (**Table 3**).

HIV	Year		Progress
	2006 (n)	2008 (n)	%
Indicator			
HIV+	9310	46202	496
Initiating HAART	400	2702	676
Total in HAART	2979	7722	259

n – number of participants; % - percentage.

Table 2.
High Activity Antiretroviral Treatment services expansion, in rural districts of Zambézia province, Mozambique.

PMTCT	Year		Progress
	2006 (n)	2009 (n)	%
Indicator			
Pregnant women tested for HIV	1995	60697	3042
Pregnant women HIV+	338	5655	1673
HIV prevalence	16.9	9.3	55

n – number of participants; % - percentage.

Table 3.
Prevention of Mother to Child Transmission of HIV services expansion, in rural districts of Zambézia province, Mozambique.

Local traditional healers were trained and engaged in research, preventive health activities, and health promotion.

Social local organizations entrepreneurship training was delivered to 75 male and female rural youth in the 16 rural districts.

3.3.3 Phase 3

Quality of students’ research protocols and manuscripts improved.

Number of students completing health studies increased.

Number of student presentations of health research studies increased.

FHS scientific publications rose by 300%.

Health education teaching by students with rural families increased in number, and targeted major local health problems [11].

The implementation research on maternal and child health, Alert Community to a Prepared Hospital (ACPH) project (an international collaboration with a team from Canada), improved several indicators in Natikiri rural population (Table 4) [12].

The culturally adjusted and focused data collection methods used in this implementation research project, demonstrated that the ACPH project was an efficient extension tool in population health education, and in continuing education of HPs with vocational training [13].

Pregnant women attending ante-natal visits reported care improvements at the local NHS facilities (Table 5).

Local health facility indicators in maternal care showed a significant increase in access and quality (Table 6).

Family and Community Medicine training at UniLúrio in Nampula, a four-year residency program for accrediting Mozambican General Practitioners just implemented in 2021, is set to change the country’ health paradigm, from hospital care in cities to PHC reaching populations all over the country.

	Adolescents			Adults		
	Oct 2017 (n = 30)	Jun 2018 (n = 140)	p-value	Oct 2017 (n = 61)	Jun 2018 (n = 221)	p-value
Knowledge (%)						
Sexual & Reproductive Health	41	56	0.135	63	76	0.0425
ACPH key messages	11	47	<0.001	50	90	≤0.001
Attitude (%)						
Contraceptives access	56	75	0.0361	63	83	<0.001

Oct – October; Jun – June; n – number of participants.

Table 4.
Adult and adolescent sexual and reproductive health and family planning knowledge, and attitude, before and after the interventions.

Question	Response (%)	2017 (n = 100)	2018 (n = 78)	2019 (n = 131)	Evolution (%)	p
		Baseline	Post 4 trainings	Post 8 trainings		
How do you evaluate your experience at ANV?	Great	5.0	39.7	42.5	+750	<0.001
	Good	69.0	56.4	48.0	–30	
	Not very satisfied	26.0	3.8	8.7	–66	
	Not satisfied	0.0	0.0	0.8	(–)	

n – number of participants; % - percentage.

Table 5.
Users’ opinions about their ante-natal visits (ANVs) experience.

Indicator	2016	2019	Indicator	Number ANVs (standard deviation)	95% CI	p
1 st ANV	1882	2393	1 st ANV (2016–2019)	2.028 (253.7)	1624.3–2431.8	0.001
4 ANVs	405	1155	4 ANVs (2016–2019)	780 (325.7)	261.7–1298.3	0.017

ANV – Ante-natal visits; CI – Confidence interval.

Table 6.
Statistically significant improvement of antenatal visits indicators in Marrere Health Centre.

3.4 Conclusion

A variety of new PHC approaches have been implemented with good results. They need to be replicated and reinforced at all health facilities and in all communities, and in all the university health care programs.

With a population over 30 million (2019), a poorly resourced health system (low funding, few health professionals), and a double burden of diseases, [14] Mozambique, urgently needs to develop new approaches. This situation, though,

has been aggravated by wars (north and centre), climate crises, and the SARS-CoV-2 pandemic. Though the country had an exceptionally low number of Covid-19 cases and deaths, access to public health services significantly decreased due to lockdowns.

Access to water and sanitation contribute to child and maternal mortality outcomes, and if the country is to seriously address the SDG of reducing child and maternal mortality, then improved water and sanitation accesses are key strategies [15].

Family planning (FP) is an efficient primary preventive intervention to reduce maternal mortality in developing countries, and this practice must be reinforced from its current low levels [16].

The MH must consolidate PHC by placing family doctors all over the country, supporting, motivating, and stabilising them and their HPs teams in rural areas [17]. A stronger commitment to PHC and FM is needed to change the actual unfavourable health paradigm [18].

4. Discussion

Rural populations are the most affected by health system and other inequalities. They suffer the greatest disease burden and have the least access to health services, in both low and middle-income countries (LMIC). Following the continuing importance of PHC strategies it is necessary to strengthen the commitment to PHC and its associated services to achieve a more efficient, effective, and equitable health care system [19].

All the interventions mentioned above benefited from a community based participatory action assessment and implementation method, especially including the target populations, from needs assessment, to intervention design, implementation method, and evaluation [20].

Forms of communication, adapted to local cultural contexts and language, through media campaigns, were strong and beneficial tools in all interventions.

HP training must be a recurrent and continuous exercise of update and spur innovation, motivating them to practice continuous professional development and higher levels of workplace and career satisfaction.

In LMIC, community health workers (including traditional healers), [21] are essential and are effective groups to reach rural populations and improve their health and social stability [22, 23].

FM in PHC has shown to be an efficient strategy to improve rural population health and their quality of life [24].

The burden of NCDs is growing, and must be approached with robust research, to provide locally relevant evidence, to organise preventative activities and deliver care [25]. The new orientations for PHC set out in the 2005 Declaration of Montevideo, are a response to the challenge of burgeoning communicable and chronic NCDs, with health services that remain generally underfunded [26].

The introduction of electronic clinical files by NHSs in PHC, will better health services and patient care [27, 28].

Research is an indispensable tool to monitor epidemiologic transitions, to tailor patient centred care, and to adapt health promotion interventions [29].

Governments must integrate their health policies with broader plans for poverty reduction, economic and sustainable development, [30] as well as increase NHS funding, [31] to achieve resiliency and greater efficiency and effectiveness [32].

5. Conclusions

Improved health services are possible with well-conceived and designed programs. Community based participatory assessment of health issues is essential to attain good implementation results to improve population health.

Multidisciplinary, simple, and complex interventions are necessary to improve rural population health. Widely varied types of rural populations and cultures are all ready to learn and to participate in health promotion and management, in cooperation with their NHSs.

Empowering rural populations on health issues and with decision making is an affordable strategy to better health indicators and services.

NHSs must innovate to respond to fast changing local and global contexts, like climate emergency, migration, and pandemics. Located, stable and well-trained HP teams are important to assure efficient PHC, and all-in collaboration with local health service education organizations, community-based groups, an NGOs.

FM is an excellent tool to extend effective PHC to all rural populations, aiming at UHC.

Reducing poverty and a strong investment in infrastructures (water, sanitation, health facilities, roads, and communications) is necessary to attain UHC.

A healthy population demands a continuous investment in information and education.

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Conflict of interest

The authors declare no conflict of interest.

List of abbreviations

ACPH	Alert Community to a Prepared Hospital
AIDS	Acquired immunodeficiency syndrome
FM	Family medicine
GDP	Gross domestic product
HAART	High activity antiretroviral therapy
HIV	Human immunodeficiency virus
HP	Health professional
HT	Hypertension
LMIC	Low- and middle-income countries
MH	Ministry of Health
MHC	Montalegre health centre
NCD	Non communicable disease
NGO	Non-governmental organization
NHS	National health system
OI	Opportunistic infection
PGNP	Penêda-Gerês National Park.

PHC	Primary health care
PMTCT	Prevention of mother to child HIV transmission
SDG	Sustainable development goals
STI	Sexually transmitted infection
TB	Tuberculosis
UHC	Universal health cover
UniLúrio	Lúrio University
USD	United States of America dollar.
VCT	Volunteer counselling and HIV testing
WHO	World Health Organization

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