

PASSI d'Argento (Silver Steps): the main features of the new nationwide surveillance system for the ageing Italian population, Italy 2013-2014

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Abstract

Background. Italy is particularly concerned by population ageing. The costs for society are substantial. In this context a national, representative surveillance system, Passi D'Argento (PDA), was implemented in 2009 to monitor “active aging” and health status in people aged over 64 and to develop preventive health programs to reduce frailty.

Methods/Design. PDA recruited a representative sample of 24 129 individuals (March 2012-January 2013) aged over 64 who were interviewed by trained staff using a standardized questionnaire. The PDA collects information about participation in society and employment, independent living, health conditions, safety and living environment. Indicator values are used to obtain population health profiles and to compare different LHUs' profiles within the same region or between different regions.

Discussion. The PDA surveillance system proved to be feasible and to be a powerful and innovative local and national tool for monitoring health status, frailty in Italy's elderly population and the essential levels of care currently provided to the elderly.

Key words

- surveillance system
- active aging
- elderly
- health status
- physical activity
- behavioral risk factors

BACKGROUND

Population aging is an increasingly important issue in many countries, particularly in Italy. Accurate assessment of the health status and needs of the aging population is indispensable for improving allocation of resources for health care and management. UN [1] data and other figures presented at the Léon conference [2] classify Italy as one of the countries with the fastest aging process in the world [3]. In recent years, Italy, like other Western Countries, has seen the proportion of its elderly (defined here as ≥ 64 years old) increase progressively: in 1990, people over 64 represented 15% of the population, today this figure is 23%, and the projection for 2050 is that one Italian resident in three will be elderly [4]. This aging process is often associated with an increase in the proportion of elderly with lack of self-sufficiency, compounded by a growing prevalence of chronic non-communicable diseases (NCDs) and associated co-morbidities [5, 6].

This increase is also related to the influence exerted by environmental factors, such as globalization and urbanization, which create conditions fostering social vulnerability and unhealthy behaviors (tobacco use, poor eating habits, insufficient physical activity, harmful use of alcohol) that contribute to an increased risk of certain negative biological conditions (high blood pressure, overweightness and obesity, dyslipidemia) causing NCDs.

Population aging also has major economic effects on social and health care expenditures. Approximately, 65% of the resources of National Health Systems, more than half of hospitalizations and almost 70% of the pharmaceutical costs in industrialized countries are accounted for by the elderly population. During recent years, it became clearer that taking into account of the increased proportion of elderly lacking self-sufficiency or affected by NCDs and multimorbidities, is a societal challenge and not only the health system's.

The concept of active ageing has been promoted by the World Health Organization (WHO) and was particularly well adopted in Europe. As part of the framework for the 2012 European Year for Active Ageing and Solidarity between Generations (EY2012) a new active Europe-wide ageing index [7] was designed and adopted. It comprises 22 individual indicators grouped into four distinct domains. Each domain covers many aspects for “measuring the untapped potential of older people for active and healthy ageing”. European Member States are encouraged to take initiatives to “give years to life, but also give life to your years” utilizing this active ageing index to monitor and compare active ageing outcomes at the international, national and regional levels.

One such initiative is the European Innovation Partnership on Active and Healthy Ageing which aims to increase the average healthy life expectancy of a European resident by two years by 2020. Carrying out nationwide interventions tailored to the elderly requires a set of indicators to monitor behavioral risk factors, and the health status of the aging population. To meet these requirements, the Italian Ministry of Health commissioned the National Centre for Epidemiology, Surveillance and Health Promotion (Centro Nazionale di Epidemiologia, Sorveglianza e Promozione della Salute – CNESPS) of the Italian National Institute of Health (Istituto Superiore di Sanità) to develop a surveillance system of elderly health status in order to support the Regional and Local Health Systems in decision making for the governance of clinical, social and the public health interventions. In 2009 [8] *PASSI d'Argento* – Silver Steps (PDA) was developed as population-based surveillance system on elderly with the following objectives:

- 1) to obtain information about quality of life and to perceive health and services' coverage and satisfaction in the elderly;
- 2) to monitor both health conditions of the elderly and preventive health intervention over time;
- 3) to identify the need for preventive actions, as recommended by the national and regional prevention plans, especially for groups identified to be at risk of frailty;
- 4) to contribute to increase the capability and know-how of public health personnel.

METHODS/DESIGN

Study design

PDA is a nationwide cross-sectional survey based on interviews to people aged 64 years and over carried out by personnel from social and health services, intended to provide nationally representative estimates on a wide range of health status, behavioural risk factors and indicators about Active and Healthy Ageing.

PDA's design and implementation are inspired by a previous population-based Italian surveillance system on 18-69 year old adults, (*Progressi delle Aziende Sanitarie per la Salute in Italia (PASSI)* - Progress in Local Health Units for Health in Italy) [9], which in turn was based on previous international experiences including the Behavioral Risk Factor Surveillance System (BRFSS) [10] established by the Centers for Disease Control and Prevention in USA in 1984.

PDA is coordinated by the Italian National Institute of Health in collaboration with the regional health authorities and their local health units (LHU). There are between 1 and 22 LHU in each Italian region and each LHU can cover from 40000 to more than 1 million people. LHU design and implement health care programs to ensure that basic and equal essential levels of assistance (ELA) are provided to each Italian citizen, irrespective of the region where he/she lives. In this context, PDA was conceived to support the important role that LHU play within the Regional Health System, and more broadly, within the National Health System. This means that while the National Institute of Health is responsible for the technical and scientific coordination of the project, the overall responsibility for its implementation lies with each administrative region and associated LHUs.

The first phase (2009-2010) comprised a multiregional pilot study to investigate the most appropriate approach for establishing the sampling plan, variables, questionnaire and algorithms (for including or excluding selected individuals and performing interviews). The second phase (2012-2013) consisted of a nationwide survey to be performed in Italy's 20 administrative regions. After this second phase, continuous data collection was planned for the following years.

Participants

To date the population study figures out approximately 13 million individuals aged over 64. The sample is randomly selected from the LHU list of beneficiaries of health services of the participating regions, stratified by sex and age (3 age groups: 65-74, 75-84, 85 and over).

Exclusion criteria are as follows: being a resident of or having a permanent address in another region, not having a contact telephone number, being currently hospitalized or in long-term care, currently living in a nursing home, or prison, being deceased, and finally, not being a speaker of Italian.

Data collection

Interviews are carried out by specifically trained personnel from social and health services.

The questionnaire is administered by telephone or face-to-face according to the age of the respondent, his/her health conditions, and his/her preferences regarding the type of interview. The face-to-face interview is carried out at the LHU premises or at the respondent's home. In the first PDA phase (2009), test re-test reliability about the interchangeability between phone and face-to-face interviews was performed. It showed that the answer choice of the questionnaire was not influenced by the type of interview [11].

To optimize resources, a training program was initially developed, to provide the skills for the effective management and operation of the survey (sample frame and selection, tool use, administration of the questionnaire by face-to-face or by telephone, management and analysis of collected data, communication of results).

PDA is supported by a web application called “PDA data Platform” (www.passidargento.it/dati) where regional datasets, following standard operative proce-

dures for data management, are made available to regions and LHUs for downloading. CNESPS performs national-level analyses and provides the regions and LHUs with tools for local data analysis, statistical testing and data plotting for communication.

Encrypted records are transmitted to a centralized database where the basic data quality controls are performed.

Variables

The study areas covered by PDA are inspired by the World Health Organization Healthy Active Ageing framework [12, 13] which consists of three main pillars: Participation, Health and Security (Table 1). Information is collected through a structured and standardized questionnaire divided into 6 sections. Study variables (Figure 1) include socio-demographic and socio-economic conditions, quality of life and health status perception, lifestyle, falls, chewing and hearing problems, depressive symptoms and social isolation signs, participation in social life, access to health care and income adequacy perception, level of autonomy (using the Katz Index of Independence in Activities of Daily Living (ADL) [14] and the Lawton Instrumental Activities of Daily living (IADL) [15] assessment).

The Katz Index is the most appropriate instrument to assess functional status as a measurement of people's ability to perform activities of daily living independently. More specifically, the ADL covered in the index are bathing, dressing, toileting, transferring, continence, and feeding. A score of 6 indicates full function while 2 or less indicates severe functional impairment (disability). The IADL in Lawton's assessment include managing finances, handling transportation (driving or navigating public transit), shopping, preparing meals, using the telephone and other communication devices, managing medications, housework and basic home maintenance. Together, ADL and IADL represent the skills that people usually need to live as independent adults.

Moreover, concerning lifestyles, physical activity is one of the elements investigated and is measured using another indicator, the Physical Activity Scale for Elderly (PASE) [16-18]. This is a well-recognized tool for the assessment of short-term physical activity in epidemiological studies of elderly people. PASE collects data on the level of physical activity in the 7 days before the

interview, divided into three components: leisure time activities, household activities and work-related activities. The higher the PASE score, the higher the level of physical activity.

In the first section of the PDA questionnaire, to assess the ability of an elderly individual to take part in the interview, his/her cognitive function is tested using a part of Mini-Mental State Examination (MMSE) [19] focusing on two different areas: memory and time/space orientation.

STATISTICAL METHODS

Sampling procedures

Regions are asked to select a regional sample size (with an expected estimate precision of $\pm 3\%$, 1100 individuals) or a sample size for each LHU (with an expected estimate precision of $\pm 5\%$, 390 individuals). A stratified random sample or a two-stage cluster sample was sometimes preferred depending on geographical size (in square km) and population density. A sample size of 1225 individuals is suggested to the regions choosing the cluster sample approach, calculated on the basis of the main variables' design effect measured during the project's pilot phase.

The sample is extracted using the probability proportional to size (PPS) method from each of six strata (men 65-74, men 75-84, men 85+, women 65-74, women 75-84, women 85+). Initially selected individuals are replaced in the following cases: no way to establish the first contact even by letter, 6 unsuccessful attempts to get in contact, phone number not available or not found, individual or proxy's refusal to take part in the interview. Individuals are replaced with others of the same sex and same age group (± 5 years). Reasons for replacement are noted and utilized for local performance analysis and evaluation.

GPs are informed by letter of the individuals finally selected for the interview, and are invited to co-operate in the survey in order to motivate their patients to participate.

Statistical analyses

Data collected from the PDA surveillance are analyzed according to time, place and specific individual characteristics with the aim of identifying inequities in health or access to services.

Table 1
Active ageing and the 3 pillars

Health	Prevent and reduce disability, chronic diseases and premature mortality
	Reduce the risk factors associated with major diseases and increase protective health factors
	Develop accessible health and social services and useful for ageing population
	Train and educate caregivers
Participation	Create opportunities for training and learning throughout life
	Make it possible to participate in economic activities and volunteer actions favoring people's references and abilities
Security	Encourage and make participation possible in social activities and community
	Ensure the protection, safety and dignity of ageing people, addressing the social and economic problems
	Reduce inequalities in terms of safety and needs of women in ageing

Source: World Health Organization, 2002.

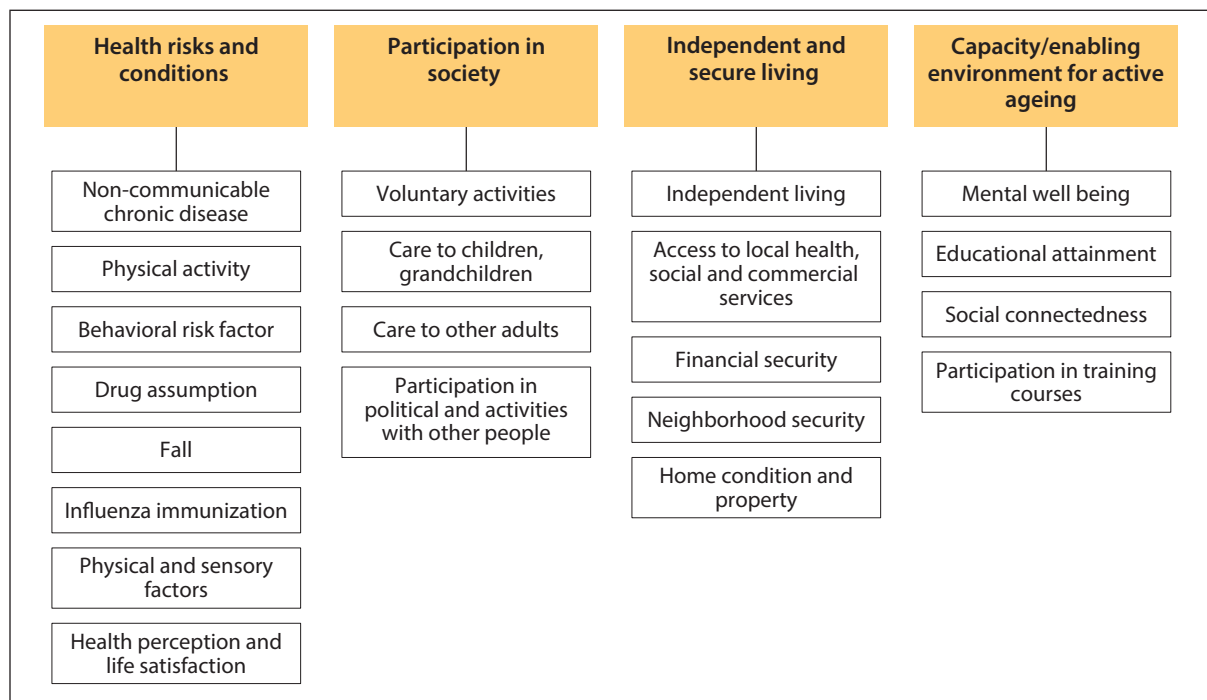


Figure 1
Thematic areas covered by PDA.

In the first step of statistical analysis, simple graphical and tabular displays are used to summarize and present prevalence data. T-tests and one-way analysis of variance (ANOVA) are used for means comparisons, and a chi-square test to measure the significance of differences in percentages. P-values ≤ 0.05 are considered significant.

Specific statistical techniques, including stratification and standardization, are used respectively to eliminate the influence of possible confounding variables and to bring to light any geographical inequalities.

The hypotheses that a relationship exists between a specific condition and a socio-demographic characteristic or a behavioral risk factor are firstly investigated by using univariate analysis.

Sample units weighing is a necessary approach to obtain representative estimates at the regional level (the number of LHUs per region ranges from 1 to 22). The weights are strata-dependent and for each LHU, six weight values are utilized, one for each gender-age specific stratum.

Prevalence of risk factors, medical conditions and specific diseases are computed over the whole dataset and stratified by sex, age group, education and economic difficulties, with confidence intervals at 95%. STATA version 12 software is used for statistical analysis.

Getting the most from the results: the PDA Community of Practice

In order to foster collaboration among health and social professionals from regions and LHU involved in PDA, a web-based "Community of Practice" (CoP) was promoted to share methods, results and to create a communication toolkit to be used locally for dissemination.

According to Wenger [20], the CoP is based on the assumption that learning is an integral part of human nature, and is much more effective the more it is inserted in the context of participation in the concrete experience of real life rather than "an individual process, with a beginning and an end, separated from the rest of our activities and the result of teaching" [21]. Basing on its previous experience in promoting CoP [22-24] the CNESPS proposed a web-based National CoP involving all the professionals and stakeholders identified by the Regions.

The PDA's CoP aimed to support regional and LHU professionals to set up the surveillance system. As CoP's members, over 380 health professionals were brought together from regions to participate to the surveillance. The CoP was initiated using a blended approach, with residential workshops and web based methodological discussions to share good practices and lessons learned from the experimental phase, to compare and choose the best approaches to improve surveillance processes and outcomes. Currently, the web platform offers to its members communication tools (set up by the same members), survey instruments (e.g. for sample selection and data collection), training materials and operational guidance, diverse frames for local data reporting and communication. The PDA surveillance protocol was also shared, and a package prepared and made available on the web for training local professionals responsible for interviews and data entry.

Communication strategy

It is commonly believed that the usefulness of the surveillance systems relates essentially to the utilization degree of the information produced. For that reason an effective and well-structured communication plan is a

priority for the PDA surveillance system. Particularly, to prepare the communication plan, a preliminary analysis and identification of the most important stakeholders was carried out by the PDA CoP and, consequently, specific communication tools were elaborated for each of them including LHU decision makers, Health Professionals, Scientific Associations and Boards, Social Welfare Decision Makers, Media, Elderly People and their Families. The *Table 2* summarizes the different communication tools elaborated according to the different stakeholders.

DISCUSSION

According to the project objectives, PDA is expected to contribute in the future to two main areas of knowledge, firstly describing variables and developing hypotheses about the health conditions of the elderly and secondly defining at-risk groups, namely for frailty, and strengthening regional and local (LHU) health systems by providing high quality action-oriented information for decision makers, stakeholders and the general population.

With respect to the second area of knowledge, following a bio-psychosocial approach, PDA defines frail people as those having two or more limitations in accomplishing IADL, and pre-frail people as those having at least one of specified risk factors (social isolation, depression, low level of physical activity, economic difficulties, other). Consequently, given that different Italian regions are currently using different definitions for frailty, in the future thanks to PDA input, health professionals both in clinical and in community settings will be able to utilize a uniform approach to easily identify and target resources for individuals at risk of frailty and functional impairment.

PDA also provides information to monitor indicators over time within (inter) the same region, LHU and district, and between (intra) regions, LHU and districts (www.epicentro.iss.it/passi-argento/). The present study was recently performed in 18 regions and in the autonomous province of Trento. The quality of the data collec-

tion process of PDA surveillance system is demonstrated by the indicators modeled after international standards [25]: preliminary data indicate that the eligibility rate was 94%, the response rate 85% (range 79.1-94.9) and the refusal rate 10% (range 4.2-17.8).

To be strongly action oriented PDA has to show timeliness in data collection and communication. For example, if an LHU implements a policy of preventive health on frailty based on social dentistry, aimed at improving the ability to chew in the over-64 population, it is important that the surveillance indicators deliver data quickly to decision makers, in order to enable the latter to manage the outcome promptly, especially if the results are not encouraging.

Although the PDA model was inspired by other national surveillance systems (e.g. *PASSI* and *OKkio alla Salute* [26]) for the general population, and international surveys conducted in the elderly [27], the novelty of PDA resides in the fact that it is implemented on a network platform and that it is managed locally, with the possibility of *ad hoc* investigations on specific themes. In particular, as the data are collected, analyzed and interpreted by the staff of the regional health system or LHU itself these professionals have the opportunity to understand, experiment with and develop their epidemiological know-how. PDA has also resulted in the creation of a network of health care professionals at several levels of the health system which contribute to increase the capability and knowledge of public health staff.

During the last decade in Italy, the awareness of the importance of having high quality information produced by surveillance/monitoring systems of the population has continued to grow. This awareness has run parallel with decision to federally decentralize the responsibility of health strategies to the country's administrative regions. Today, by the means of a pool of health/social indicators measuring citizen's "essential levels of care", each single region is annually evaluated by the central government and financed according to its level of performance. In Italy, the recent National Prevention Plan (2010-2013) included four main areas of investigation:

Table 2
Communication tool kits for different target

Stakeholder (SH)	Communication tools
Decision makers	General regional report on the health status of elderly Specific SH report on selected priority areas of interest and action Selected weekly news on PDA national website
Health and social professionals	General regional report on the health status of elderly Specific SH report on selected priority areas of interest and action Standardized communication workshop Selected weekly news on PDA national website Periodically pages publication on website about specific and priority topics concerning the health of the elderly Articles publication on the National Epidemiological Bulletin (www.epicentro.iss.it/ben/) Spine charts preparation with the national and regional values to be used locally for comparisons*
Scientific Associations and Boards	Specific SH report on selected priority areas of interest and action
Media	Publication of weekly news and updates on the PDA website Snapshot thematic information to be used at regional and local levels
Families and people aged 65 and over	Specific SH report on selected priority areas of interest, mainly related to preventive health

*Spine chart is designed to give users a cross-sectional view across multiple indicators for a specified geographic location.

predictive medicine, universal prevention, prevention in at-risk groups and prevention of disability. The substantial size and scope of the plan meant its implementation has been challenging. This complexity underlines the need to have surveillance and monitoring systems in place at the regional level to produce valid and timely data both on the problems targeted and on the main indicators measuring the spread of prevention activities. Indeed, in 2013, according to the Ministry of Health (personal communication), most Italian regions were able to produce, through their surveillance systems, timely and adequate information for measuring processes and targets of their Regional Preventive Plans.

Besides the preventive population health activities, the PDA also has major potential for improving clinical management/prevention and public health research. Through the large sample of older people interviewed, for the present analysis, it was also possible to provide age-sex percentile distributions of specific indicators (e.g. the PASE score), to be used in hospital and primary care settings to assess the physical activity level of single individuals and, where the level was lower than the 25th percentile for the individual's age and sex, to offer the social worker the opportunity to refer the elderly to the adequate health service, or provide the general practitioner with the opportunity to intervene to promote physical activity (or adapted physical activity).

PDA provides several opportunities for further research. First, it allows the identification of individual correlates of specific diseases, frailty and medical conditions, but also an evaluation of ecological effects by assessing regional differences or north-south gradients. Second, it could be connected to a set of environmental and structural variables (e.g., characteristics of the regional health systems, understaffing, number of primary care physicians/patients, etc.) with the aim of understanding to what extent such factors may be determinants of health outcomes in the elderly.

Third, as the study population was representative of the Italian population of the elderly, it can be used as a reference population for additional research into health status in specific categories of elderly patients (e.g., those hospitalized for specific chronic conditions). Finally, as the project envisages a biennial survey, repeated cross-sectional assessment can be used to forecast the demand of care and be used for health economic assessment for better allocation of resources objectives.

There are limitations to the current analysis. Despite several efforts made to assure the representativeness of the 2013 survey by creating a complex sampling design, the database nonetheless fails to be 100% representative of the Italian population due to a few geographical areas as some regions did not participate. Nevertheless, considering the power of the database, the quality of the standardized data collection and the sampling plan, we believe this system has great potential for use in research, planning and policy making.

Furthermore, 3% of the elderly Italian population currently lives in nursing homes. This suggests that these people on the whole have poorer health conditions than their peers. The fact that they are not represented in PDA would suggest that the PDA overestimates the

positive health conditions of the Italian ageing population. A second limitation is the potential negative effect brought about by the percentage of interview refusals. Despite the low level (9.6%) observed compared with other experiences [28], this factor may nonetheless bias estimates of studied variables. To conclude, we believe that this system constitutes a strong support in a historical period when Italian regions have acquired autonomy in deciding the health system that best addresses the vision of local decision makers and societies. Furthermore, it can also be replicated in other countries, especially those facing serious public health problems and resource allocations because of an increasing aging population.

For the coming years, besides guaranteeing a scientifically sound surveillance system, PDA promises to become a useful and user-friendly source of information to strengthen health governance and policy-making processes at regional and LHU levels, and to improve its function as a channel for observing, understanding and enhancing the quality of life and health in the over-64 population, in particular groups and individuals who are frail or at risk of frailty.

Authors' contribution statement

Benedetta Contoli contributed to the conception and the design of the study, data collection and analysis, wrote the first draft of the article and contributed to the different versions of the manuscript. Patrizia Carrieri gave substantial contribution to the analysis and interpretation of the data, wrote some sections of the article and revised the whole manuscript critically for important intellectual content. Maria Masocco contributed to the data collection and analysis and revised the final version of the manuscript. Luana Penna contributed to the data dissemination and revised the final version of the manuscript. Alberto Perra designed the study and the data collection, interpreted the results and played a major role in the implementation of the whole surveillance system. He also substantially contributed and revised the different versions of the manuscript. All the authors and contributors gave final approval of the current version of the article. The authors and the contributors have no conflicts of interest to declare.

Acknowledgments

The authors thank the many regional representatives and the regional/local coordinators who contributed to the data collection. Special thanks to the health care workers in the public health departments in the LHUs who conducted the interviews. Our thanks also to Monica Bolli and Valerio Occhiodoro for their administrative support and to Jude Sweeney for the revision and the editing of our manuscript. This work was supported by the Italian Ministry of Health/National Centre for Disease Prevention and Control (grant 4393/2004-Centre For the Control and Prevention of Diseases -CCM).

Conflict of interest statement

There are no competing interest to declare.

Received on 4 March 2016.

Accepted on 14 July 2016.

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