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The versatility of health impact assessment: experiences in Andalusia and other European settings





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Abstract

The driving forces behind current health challenges often lie outside the direct control of the health sector; ensuring the inclusion of health and well-being as a key component of policy development in all sectors (the Health in All Policies (HiAP) approach) has been emphasized as the best way to approach these challenges. As a tool to this end, health impact assessment (HIA) can be used to determine the potential effects of a proposed policy, plan, programme or project related to population health and the distribution of these effects within the population. This publication describes experience gained in HIA implementation in Andalusia over the last five years and includes case studies from Andalusia and other European settings, illustrating a range of approaches taken in various regional, political and policy contexts. Focusing on the development of the tools and procedures involved, it presents general conclusions, including elements of success and conflict, misgivings, windows of opportunity and lessons learned.

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Acronyms

AAQMN	Andalusian Air Quality Monitoring Network
APHA	Act 16/2011 on Public Health in Andalusia
AP-HRA	air-pollution health-risk assessment
ASAQ	Andalusian Strategy on Air Quality
CSV	comma-separated value
EA	environmental assessment
EHIA	environmental health impact assessment
EHRA	environmental health risk assessment
EIA	environmental impact assessment
GIS	geographical information system
HBM	human biomonitoring
HIA	health impact assessment
HiAP	Health in all Policies
HIAPR	health impact appraisal
IECA	Statistics and Cartography Institute of Andalusia
LSSL	Longitudinal Statistics on Survival and Longevity
NRW	North Rhine-Westphalia
PHW	Public Health Wales
SDH	social determinants of health
SDP	Spatial Distribution of the Population
SEA	strategic environmental assessment
UAT	upper assessment threshold
WHO-AQG	WHO air-quality guidelines

Foreword

As the Adelaide Statement on Health in All Policies asserts, a healthy population and a reduction of inequalities and the social gradient are key to achieving a fairer and more prosperous society; hence, this should be the main goal of public authorities. Since Spain is substantially a decentralized country, Andalusia holds most of the powers of governance: being able to promote health and well-being through all sectoral policies is a great opportunity and a responsibility that cannot be taken lightly.

Any initiative that contributes to decision-making processes by increasing the knowledge of the public authorities about the future consequences of either their own policies or those arising from projects they authorize must be considered good news. Health impact assessment (HIA), which systematically focuses on health outcomes and helps to identify unexpected outcomes and their uneven distribution has become an ideal tool for building a fairer, more advanced society.

In Andalusia, fully committing to the use of HIA has meant systematically subjecting most decision-making processes to a regulated procedure with complete disclosure, thus greatly increasing the transparency and accountability of all public authorities. HIA allows for better involvement at all levels, including the general public, making it easier for the latter to make informed decisions regarding complex projects.

The Andalusian case studies portrayed in this publication allow us to understand the tools and methods used to achieve our objectives. HIA provides an added value in comparison to other types of evaluations, such as environmental assessments. It also serves to increase health awareness in non-health sectors, such as that for urban planning. Finally, it contributes to the transparency and accountability of the public authorities. Our experience in Andalusia has shown that the key element to the successful implementation of HIA is strong political and technical leadership.

We are very satisfied with our achievement after many years of hard work and, indeed, proud to present our results to other European countries. They could have no better framework than that provided by the WHO Regions for Health Network with its long tradition of facilitating the exchange of experiences to enrich regional health practice in Europe. We are grateful for the trust placed in us and hope that this publication will help to promote the systematic implementation of HIA in Europe.

Jesús Aguirre Muñoz

Regional Minister of Health and Families of Andalusia

Foreword

I am pleased to present this publication, which focuses on experience gained in Andalusia (Spain) in the implementation of health impact assessment (HIA) and includes case studies from Flanders (Belgium), North-Rhine Westphalia (Germany) and Wales (United Kingdom).

Using quantitative, qualitative and participatory techniques, HIA enables the identification of potential health impacts of policies, plans and projects in diverse sectors. The publication illustrates how, through a combination of procedures, methods and tools, the broad scope of HIA can be instrumental in promoting and improving health across all sectors. This is in line with the 2030 Agenda for Sustainable Development, which calls for intersectoral action towards achievement of the Sustainable Development Goals (SDGs) and for an understanding of the interdependence of the different sectors on each other to this end. Progress towards SDG 3 (good health and well-being) will result in advances towards the achievement of SDGs pertinent to these sectors – this connection can be demonstrated through HIA.

HIA also benefits decision-makers by providing them with the necessary information to guide them in choosing optimal measures to prevent disease and injury and promote health, as well as by facilitating intersectoral collaboration.

The case studies from Andalusia, Flanders, North Rhine Westphalia and Wales identify a myriad of ways in which different disciplines and sectors can be involved in the HIA process. They demonstrate the great strides made in these settings through the use of this tool; may they encourage others to follow suit.



Francesco Zambon

Coordinator, Investment for Health and Development in Healthy Settings
WHO European Office for Investment for Health and Development

Preface

Andalusia, one of the 17 autonomous communities in Spain, is located at the most south-western point of mainland Europe. Covering an area of 87 597 km², it has a population of 8.4 million (18% of the total population of the country). The overall health status in Spain is improving, and national life expectancy is among the highest in the European Union. In Andalusia, life expectancy is 81.9 years (79.2 for males and 84.5 for females).

The Regional Ministry of Health and Families of Andalusia is responsible for health policy, planning and regulation, and the provision and management of health care in the region. The Regional Ministry also provides leadership of the Andalusian Public Health System. As stated in the Andalusian Health Act (1998) and the Andalusian Public Health Act (2011), its driving principles are based on equity, guaranteed rights to health care, territorial homogeneity, accessibility, transparency and participation.

The Andalusian Public Health System comprises a wide network, based on accessible, quality, patient-centred care. There are two levels of care: (i) primary health care, the core element and backbone of the System



Pictures provide by Turismo Andaluz

(and the managerial unit for this level of care), with primary-health-care teams working in 1500 centres grouped in health districts throughout the region; and (ii) specialized care of varying complexity, including outpatient, inpatient, day-case and emergency care, provided in rural to university- and tertiary-hospital settings in 49 public hospitals . Other dependent entities, such as the Andalusian School of Public Health and the Progress and Health Foundation, foster training, research and innovation in the field of public health and health care.

As part of the Spanish National Health System, the Andalusian Public Health System is funded by taxes and operates predominantly in the public sector. Health care is provided free of charge at point of care; medication is covered in part. Around 100 000 health-care professionals work in the public health-care system in the region.

The overarching goals of the region's health policy are stated in the Andalusian Health Plan passed by the Regional Government of Andalusia. The Plan defines action to be taken by the different departments, using the Health-in-All Policies (HiAP) approach, as well as the allocation of resources and funding from each department to this end. Local health action plans are developed in collaboration with the municipalities. As regulated in the Andalusian Public Health Act, health impact assessment (HIA) is a compulsory element of all sectoral plans and programmes approved by the Regional Government that could have an impact on health, general urban planning and activities related to environmental control.

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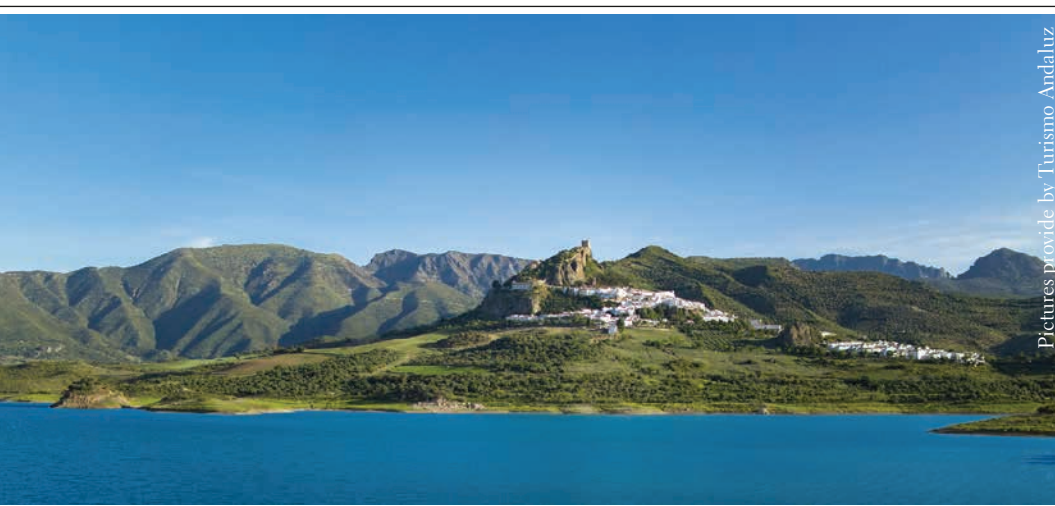
The main part of the report, including the case studies from Andalusia, was written by: Luis Ángel Moya Ruano, Technical Officer, and Francisco Javier Rodríguez Rasero, Head, Health Impact Assessment Sector, in close collaboration with Encarnación Madrid Verdugo, Technical Officer, Regional Ministry of Health and Families of Andalusia, Seville, Spain; José Vela Ríos, Head of the Environmental Health Unit, Regional Ministry of Health and Families of Andalusia, coordinated the work. All contributors are members of the Regional HIA Team in Andalusia.

The respective case studies from Flanders, Belgium, North Rhine-Westphalia (NRW), Germany, and Wales, United Kingdom, were developed by:

- Bart Bautmans, Public Health Officer, and Hilde Van de Maele, Public Health Officer, Environmental Health Care Team, Agency for Care and Health, Department of Prevention, Flemish Ministry of Welfare, Public Health and Family, Brussels;
- Odile Mekel, President, HIA Section, European Public Health Association, North-Rhine Westphalia Centre for Health, Head of Division Healthy Settings, LZG NRW, Bochum; Rainer Fehr, Bielefeld University; and Sarah Sierig, Rödinghausen Municipality;
- Liz Green, Programme Director for Health Impact Assessment, Public Health Wales, Wales Health Impact Assessment Support Unit, Policy Research and International Health Directorate (WHO Collaborating Centre on Investment for Health and Well-being) with contributions from Kath Ashton, Principal Health Impact Assessment Development Officer, Wales Health Impact Assessment Support Unit, Public Health Wales (who also reviewed the case study), and Sumina Azam, Consultant in Public Health, Policy Research and International Health Directorate (WHO Collaborating Centre on Investment for Health and Well-being), Public Health Wales, Cardiff.

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Executive summary

The driving forces behind current health challenges often lie outside the direct control of the health sector. It has been emphasized that the best way to tackle these challenges is to ensure the inclusion of health and well-being as a key component of policy development in all sectors (the Health in All Policies (HiAP) approach).

Health impact assessment (HIA) is a systematic process the aim of which is to determine the potential effects of a proposed policy, plan, programme or project relating to the health of a population and the distribution of these effects within the population, as well as to provide advice on how to manage these effects.

Tools, such as HIA, can make a real difference to health by enabling policy-makers to predict the consequences of their proposals on the well-being of affected populations, and optimize them accordingly. The advocacy and support of the public health sector are imperative to achieving these goals. This means, however, involving public health professionals in areas outside their usual spheres of expertise, and confronting them with issues related to other sectors, such as those associated with urban planning and the development of infrastructure.

In addition, expertise in and capacity for HIA are still relatively uncommon in Europe. Indeed, the lack of knowledge about and resistance towards this tool among public health officials are usually cited as examples of barriers preventing its use. To deal with this problem, some countries have been developing resources, such as databases and websites, while others have embarked on building relevant capacity. Nevertheless, there has been a steady growth in the use of HIA in Europe and it would be expedient to share some case studies that illustrate success in this area.

The aim of this publication, which has been created within the framework of the WHO Regions for Health Network (RHN), with the involvement of the Regional Ministry of Health and Families of Andalusia, Spain, describes experience gained in HIA implementation in Andalusia over the last five years. Focusing on the development of the tools and procedures involved,

it presents global conclusions, including elements of success and conflict, misgivings, windows of opportunity and lessons learned.

RHN experience in assessing health impacts of policies or projects on, and creating synergies between, different activity sectors is inspirational and easy for other public bodies to implement as it focuses on finding successful solutions to challenges met. This publication includes case studies from Andalusia and other RHN settings, illustrating a range of approaches taken in various regional, political and policy contexts in Europe.

Some of the case studies from Andalusia describe the tools and methods used to achieve the intended goals. They also illustrate how HIA promotes taking account of issues often neglected in decision-making processes, thus adding value to other assessments that are underway.

The first example relates to the food industry in Andalusia. Here, the HIA focused on describing the affected population and singling out vulnerable traits, using geographic information systems and open social and demographic data. Combined with a study on the dispersion of air pollutants, the tool was useful in finding inequalities in the distribution of impacts, thus propitiating the inclusion of additional measures of emissions abatement.

HIA also helps raise awareness in non-health sectors. The second case study shows how it brought about a change in the attitude of the urban-planning department of a large city regarding the relocation of a social centre. Based on the expected positive impacts of such a move on the social determinants of health (SDH) outlined in the HIA, and the results of a public consultation, after some initial reservation, the department decided to find a more optimal site for the social centre.

Finally, HIA also allows for greater transparency and accountability in relation to public policies. For example, as illustrated in the third case study, the HIA report on the draft Andalusian Air Quality Strategy not only provided health outcomes in terms of morbidity and mortality, but also turned them into monetary values. Experience has shown that it is often difficult for policy-makers to understand standard health measures and presenting them in this way can make them clearer. HIA also makes it possible to contribute to cost–

benefit analyses and is in line with the guidelines on public-policy assessment included in the European Commission's *Better regulation toolbox*.

Case studies from three other regions – Flanders (Belgium), North Rhine-Westphalia (Germany), and Wales (United Kingdom) – provide examples of alternative ways of using HIA as a tool.

Experience in Andalusia has shown that the key elements of successful HIA implementation are: strong political leadership, requiring both substantial negotiating skills and the ability to find allies and strategic partners; solid technical leadership, enabling the provision of the guidelines and criteria required for performing the assessments; and the availability of financial, human and capacity-building resources, which are essential to defining the scope of the projects correctly. Other mechanisms are the integration of HIA into existing procedures and the implementation of a network-based strategy aimed at streamlining an exchange of experiences on its use.





Pictures provide by Turismo Andaluz

1. HIA implementation in Andalusia: general framework

Developed societies face novel social and health challenges; available data show increased mortality and morbidity rates due to chronic, noncommunicable diseases and their unfair prevalence in the most deprived social strata (1). Furthermore, public awareness is on the rise and increasingly higher health standards are often required, straining the sustainability of health-care systems. In fact, they might be entirely unprepared to cope with the future demands and costs of chronic, sometimes life-long, care. Prevention is by far the best option. In most cases, the driving forces behind the rise of chronic diseases, including demographic ageing, rapid urbanization and the globalization of unhealthy lifestyles, lie outside the direct control of the health sector.

It has been emphasized that the best way to tackle this challenge is for all sectors to include health and well-being as a key component of policy development (2). The potential for using HIA to mainstream health into sector policies has also been increasing at the international level (3) (Box 1).

Box 1. Definitions of HIA

Health impact assessment is a combination of procedures, methods and tools by which a policy, programme or project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population (4).

Health impact assessment may be defined as a combination of procedures, methods and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, programme or project on the health of a population and the distribution of those effects within the population. HIA identifies appropriate actions to manage those effects (5).

Health impact assessment is a systematic process that uses an array of data sources and analytic methods and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population. Health impact assessment provides recommendations on monitoring and managing those effects (6).

HIA has been practised all over the world for more than 20 years, usually as a voluntary action. Worldwide, there are fewer experiences of its

institutionalization, meaning its systematic integration into the decision-making process and the creation of a permanent demand for HIA use (7). A window of opportunity was opened, however, with the revision of the European Union (EU) Directive on environmental impact assessment (EIA) (8), which explicitly mandates the inclusion of impacts on health and the human population in its processes. Box 2 highlights some of the useful features of HIA.

Box 2. Appealing and useful features of HIA

HIA's prospective approach enables the prediction of potential positive and negative impacts of policies, plans and projects prior to their approval and implementation.

HIA is effective in improving the outcomes of a proposal. By seeking synergies with the aims of other sectors, it can generate new information about unintended effects and distributional issues, allowing the formulation of recommendations to promote positive impacts and avoid (or reduce) negative ones.

Health equity and public participation are key elements of HIA. In using it, authorities strive to adopt transparent mechanisms of auditing and accounting for impacts on health and equity.

Andalusia took advantage of the timeliness of the revised Directive (8) to adopt HIA as the tool needed to act upon the conclusions of initiatives taken in connection with the strategic line started in 2003, which revolved around Health in All Policies (HiAP) (9). At that time, the III Andalusian Health Plan (10) already included moving from merely coordinating with other sectors to collaborating with them on joint action.

In 2008, the Andalusian Environmental Health Plan (11) set the target to include the health authorities in all processes regulating environmental prevention and control instruments. Subsequently, in 2009, the first draft of the IV Andalusian Health Plan (12) included HIA and local health plans as tools for implementing HiAP (9) and channelling public health as a Regional-Government priority.

All this work culminated in the publication of Act 16/2011 on public health in Andalusia (APHA) (13), a regulatory text in which HiAP and HIA have significant roles, and the passing of a decree mandating the use of HIA, which came into force in 2015 (14). Political commitment, legislation and strong stewardship are often cited as prerequisites for HIA implementation (15), but these elements comprised only the first step in Andalusia; as will be seen later in the publication, implementing HIA also meant:

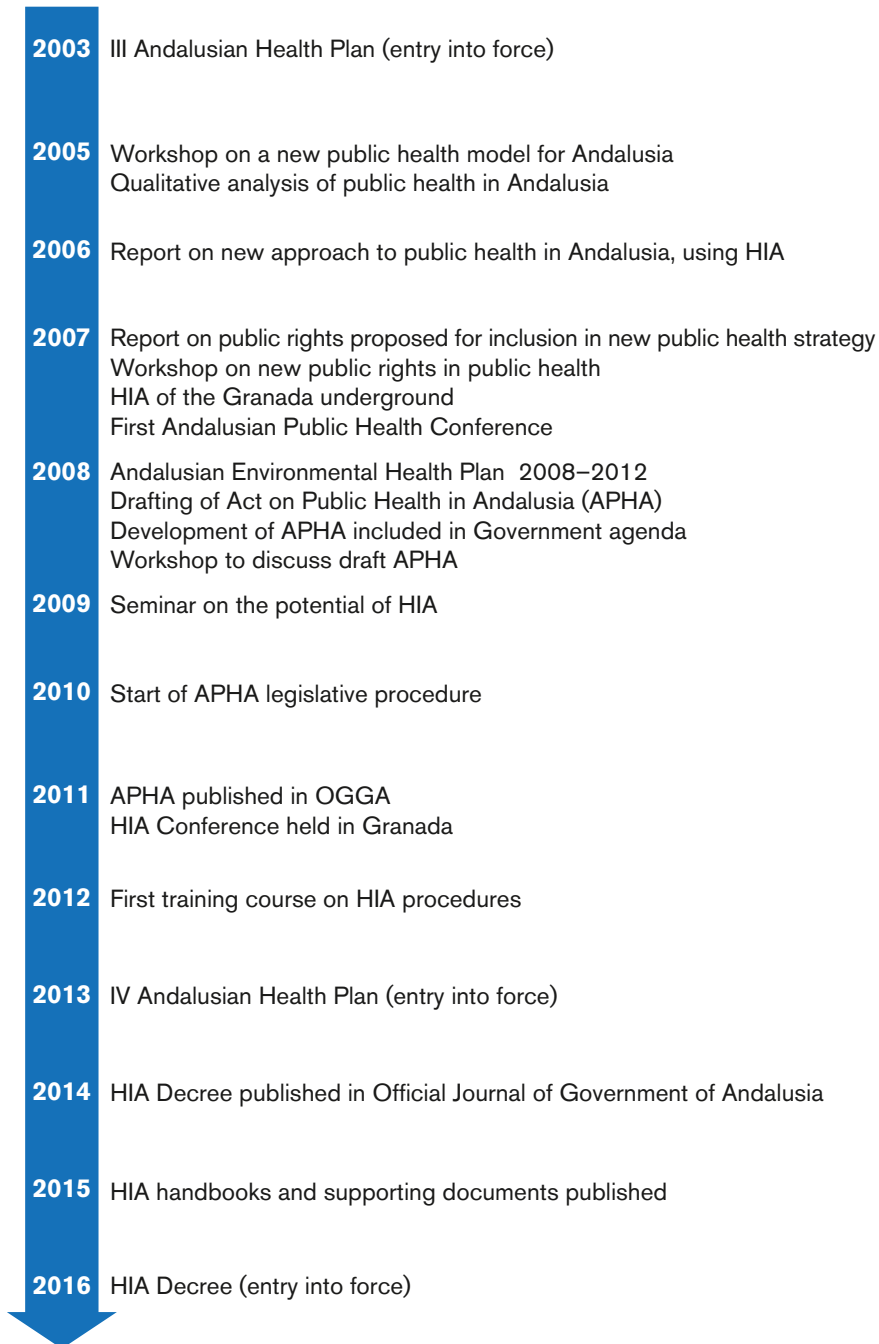
- clarifying the definition and operationalization of HIA (chapter 2);
- developing guidelines, methodological criteria and tools (chapter 3);
- building the necessary capacity to put HIA into practice and improving intersectoral collaboration to this end (chapter 4).

Fig. 1 provides an overview of measures taken between 2003 and 2015 in developing HIA in Andalusia.



Pictures provide by Turismo Andalúz

Fig. 1. Chronology of HIA development in Andalusia



Note: OGGA = Official Journal of the Government of Andalusia.

2. The conceptual challenge: defining an assessment model

Defining the HIA procedure in the administrative procedures and policies of a region is not an easy task. In devising a HIA model, several factors need to be considered and the right choices made to balance the region's objectives with the resources available:

- legal character of the HIA: mandatory vs voluntary; binding vs non-binding;
- scope of the assessment: fixed vs screening; public vs private activities; relevant sectors;
- procedure: total or partial integration vs stand-alone document;
- stakeholder involvement/roles.

2.1 LEGAL CHARACTER OF HIA

Andalusia decided on a mandatory and binding HIA, as set out in APHA (13). As a mandatory procedure, HIA would be embedded systematically in decision-making processes to maximize health outcomes and tackle health inequalities. Its being binding meant that if the health authorities were to deem the assessment unfavourable, the project in question would be rejected.

This decision was controversial, sparking opposition among both developers and the administrations mandated to foster competitiveness and economic development. It also seemed to conflict with other political objectives, such as the achievement of economic growth and the creation of jobs, while any political gains it might bring remained unclear due to the difficulty of achieving short-term results.

Conversely, these features might have been assets for the following reasons.

- As a mandatory procedure, HIA allows the health authorities to choose the projects to be examined, thus safeguarding against assessing only those of either highly motivated developers, or those of which a favourable outcome could be expected.

- The binding character of the report ensures that the health authorities have the possibility of effectively influencing the final decisions on the projects.
- A legislative approach facilitates the sustainment of improvements in health determinants over time. Since many health outcomes are influenced by long-latency processes, this strategy might be advisable in the long run.

2.2 SCOPE OF THE ASSESSMENT

According to APHA (13), the scope of HIA in Andalusia is fixed rather than determined by screening. It covers the following areas:

- Regional-Government policies in all sectors
- urban-planning projects
- private or public projects subject to EIA.

There were both pros and cons associated with establishing a fixed scope. On the one hand, it was a sound choice, based on the principle of legal certainty for developers, and it eliminated the possibility of abusing administrative discretion. In addition, the administrative procedures involved were well known and facilitated partnerships with relevant departments and organizations. On the other hand, choosing a fixed scope made it difficult to establish objective criteria for defining HIA, without which the effectiveness of the tool could be jeopardized.

There is always a tendency to include as many activities as possible to avoid missing relevant ones out. This sometimes results in too many resources being spent on minor projects. The key to solving this conundrum would be to include a screening stage in the assessment methodology.

2.3 PROCEDURE

There is no specific administrative procedure attached to HIA in Andalusia. The HIA report, on the other hand, is a stand-alone document, which the developers and competent authorities are required to produce as part of

their own administrative procedures related to HIA. Table 1 describes these procedures and their different scopes, and lists the developers and competent authorities involved.

Table 1. HIA integration into administrative procedures in non-health sectors

Procedure	Scope of procedure	Developer	Competent authority
Approval of plans and sectoral programmes	Regional-Government policies	Regional departments responsible for drafting plans or sectoral programmes	Regional Government of Andalusia
	Urban-planning projects	Variable – usually the city/town council	Regional Ministry for Urban Planning
Authorization of environmental projects	Private or public projects subject to EIA	The developer applying for authorization of a private or public project	Regional Ministry for Environment

Although, in general, HIA reports must be integrated into the administrative procedures of developers and competent authorities as standalone documents, projects subject to EIA are an exception.

If a project is located over 1000 m from a residential area, the assessment of any significant direct and indirect effects on the population, including health effects, is performed within the framework of Directive 2011/92/EU (8) relating to EIA.

Article 6 of the Directive (8) establishes that the competent authority most likely to be involved in a project (for example, the public health authority) be given the opportunity to comment on the information provided by the developer. To this end, the competent authority would prepare a population and human health (PHH) report (not to be confused with the HIA report) (Fig. 3). PHH reports are drafted as if they were HIA reports, but they are not binding. Figs 2 and 3 show the process of integrating HIA into existing environmental administrative procedures in the case of projects being implemented less than 1000 m and more than 1000 m from residential areas, with the exception of urban-planning projects, plans and policies.

Fig. 2. HIA integration into environmental administrative procedures: projects being implemented < 1000 m from residential areas

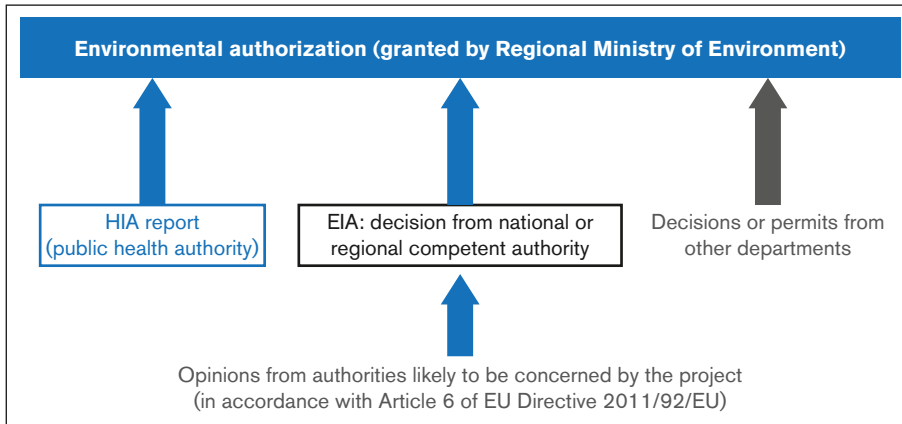
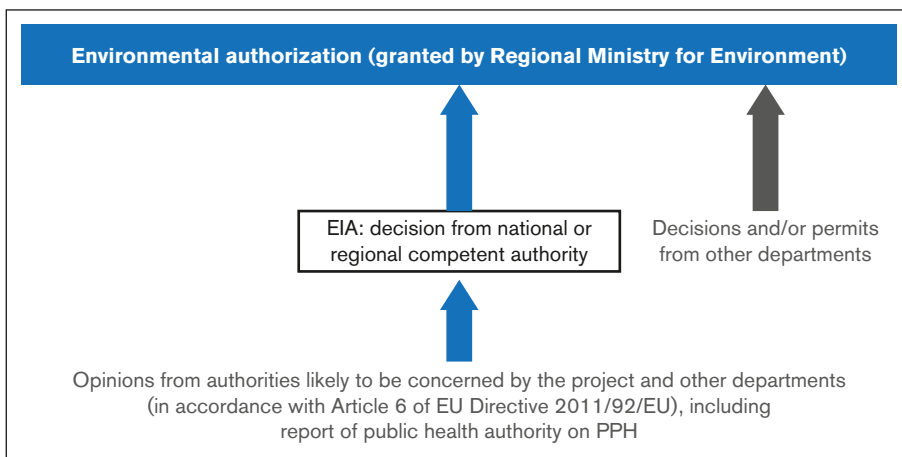
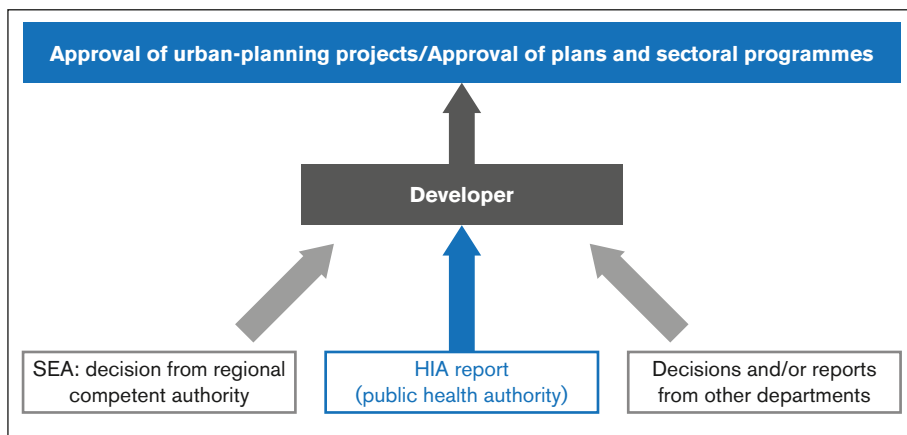


Fig. 3. HIA integration into environmental administrative procedures: projects being implemented >1000 m from residential areas



In the case of urban-planning projects, plans and policies, integrating HIA into the relevant administrative procedures is easier. This takes place independent of the environmental assessment of plans and programmes (namely, the strategic environment assessment (SEA)), which is regulated by the SEA Directive (16). SEA has a slightly different scope from that of HIA as can be seen in Fig. 4.

Fig. 4. HIA integration into existing approval procedures: urban-planning projects, plans and policies

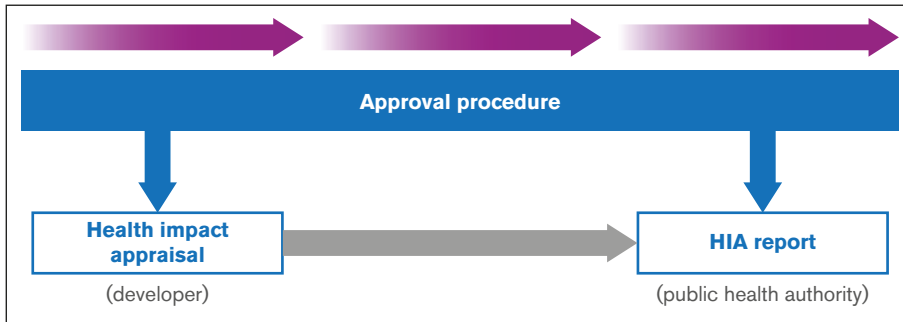


2.4 STAKEHOLDER INVOLVEMENT

Stakeholder involvement in the HIA procedure outlined in APHA (13) can be summarized as follows (Fig. 5).

- The developer (the applicant for authorization of a private project, or the public authority initiating a plan, programme or project) must prepare a health-impact appraisal (HIAPR), identifying, describing and assessing the predictable effects (both positive and negative) of the activity on the health of a population.
- The developer must include the HIAPR in the application for authorization.
- The competent authority responsible for granting environmental authorization – that is, the authority (or authorities) stipulated in the Andalusian Environmental Protection Act (7/2007) (17) – forwards the application for authorization to the public health authority, together with the results of public consultations.
- The public health authority prepares the HIA report and forwards it to the competent authority.
- The competent authority decides on action to be taken in the light of the HIA report.

Fig. 5. Simplified scheme of HIA integration into existing administrative procedures



Instead of adopting an assessment scheme involving collaboration among the health authorities, the developers and the public (which is commonplace in the case of voluntary HIAs), Andalusia opted for sequential staging.

Voluntary HIAs are usually conducted by a steering group (comprising representatives of the health authorities and the developer, as well as community members) (18). This method would be impractical in Andalusia as it is unlikely that the different stakeholders could involve themselves to an equal degree or meet the same deadlines. Therefore, Andalusia decided to follow the procedure described above, whereby the health authorities, developers and community members become involved in stages.



Assuring legal certainty for the developers, especially regarding deadlines, was key to this decision. The guidelines on HIA implementation in Andalusia (19,20) strongly recommend that developers foster community involvement beyond the legal requirement of public consultations, and that the health authorities evaluate the process. With respect to the latter, if developers fail to meet the community-involvement standards, the health authorities could request them to conduct a further analysis of the potential health impacts and implement additional risk-management measures. This strategy seeks to avoid the risk of downplaying the role of the community in HIA.

2.5 IN-DEPTH DESIGN: CHALLENGES AND SOLUTIONS

APHA (13) provided the basic legal framework for HIA implementation; further development was the subject of subsequent regulations. Several problems arose in this connection and different steps were taken to overcome them (Table 2).

Table 2. Action taken to overcome difficulties in HIA implementation

Viewpoint	Problems identified	Action taken^a
Public health services	Work overload due to HIA implementation. Incorporation of other work areas, such as urban planning.	Tasks were divided among provincial and regional public health services. An intuitive, flexible and reasoned HIA methodology was developed.
Developers	Time and costs involved in drawing up another document. Lack of experience in identifying and assessing health impacts, which could lead to delays in administrative procedures.	A pre-consultation procedure was included. ^b Decision taken not to extend time limits for authorizations. Procedures were simplified (where possible) when no significant health impacts were involved, using a SDH approach to the health assessment (see section 2.6). An intuitive, flexible and reasoned HIA methodology was developed.

Table 2 contd

Viewpoint	Problems identified	Action taken ^a
Credibility of HIA (as seen by other departments and developers)	Difficulties in coordinating the HIA report with the reports, decisions or opinions of competent non-health authorities. The risk of plans or projects without a clear health-related content questioning the usefulness and effectiveness of HIA.	The HIA report was effectively integrated into existing procedures. Focus was placed on health-related aspects, such as health inequities inadequately covered in other impact assessments, adding value to the HIA procedure.

Notes. ^aThis is accordance with the HIA Decree, which came into effect in 2015, establishing the HIA procedure in Andalusia (14). ^bThis enables the developer to request the public health authority to define what the HIA report should cover before applying for authorization.

2.6 FOCUS ON HEALTH EQUITY AND SCIENTIFIC EVIDENCE

The most important challenge to implementing HIA was constructing a methodology for developers. This was a legal requirement in that the HIA Decree published on 15 December 2014 established that the Regional Ministry of Health should prepare methodological guidelines to support developers in carrying out HIAPRs (14).

Thus, in the 6-month interval between publication of the HIA Decree (14) and its entry into force on 16 June 2015, guidelines on conducting HIAs of urban-planning projects and projects subject to EIA were prepared (19,20). In addition, eight supporting documents were developed and a HIA website (21) put in place.

The methodology included the following key factors.

- *Equity as the cornerstone*

As an added value, HIA focuses on SDH and equity. Tools were needed to characterize the affected populations and, above all, identify those that were vulnerable. Thanks to the partnership between the Regional Ministry of Health and the Statistics and Cartography Institute of Andalusia (IECA), work started, using information available through

the geographical information system (GIS) on the IECA website. Some examples of how this was done are given in chapter 5.

- *Analysis for determinants*

The guidelines on HIA implementation in Andalusia (19,20) incorporate a screening tool that makes it possible to focus on projects that potentially have significant health impacts. A SHD analysis was included in the methodology to avoid assessment of irrelevant projects. Further information on this is given in chapter 3.

- *Public participation and perception*

Both issues are included in the preliminary analysis, which is one of the stages of the HIA process (see section 3.1).

- *Scientific evidence*

The use of scientific evidence in HIA is of the utmost importance from two perspectives.

1. Regarding developers' rights, as the HIA report is binding, any limitation of these or any requirement made of developers must be supported by scientific evidence and justified by the proportionality principle (22).
2. Regarding public perception, scientific evidence is very useful in cases where there are negative reactions but no adverse health impacts.

Annex I summarizes the Andalusian HIA model, which follows the analytical framework used by Lee et al. and described in the WHO publication, *Cross-country analysis of the institutionalization of health impact assessment* (2013) (3).

3. The technical challenge: development of methodology and tools

HIA is usually aimed more at optimizing impacts than at quantifying them. For this reason, the main technical challenge lies in making HIA into a useful tool for implementing the HiAP strategy (9) and helping to introduce and/or highlight the role of the health factor in decision-making.

According to current EIA experience in Andalusia, sensitizing developers in the environmental sector to and involving them in the HIA process has proven to be crucial to its success. Given that these developers (and consultants) are not usually familiar with health aspects, the health authorities have had to take the lead in technical matters and develop tools and procedures to help them assess their projects (Box 3).

Box 3. The importance of a clear, tiered and tailored HIA methodology

According to the Andalusian experience, it is of the utmost importance that HIA methodology is:

- easy to understand, for developers and/or consultants who are not used to assessing health impacts;
- tiered, to enable developers to focus on the main potential health impacts;
- tailored, so that it can be used for all types of projects or policies.

As mentioned in chapter 2, the conditioning factors in the institutionalization process influenced the development of the Andalusian HIA methodology (23). Table 3 lists its most important features and ways in which it has been implemented. The solutions proposed in the methodology to the issues that are most relevant to the Andalusian model – adaptation to the conceptual model of health determinants and identification of vulnerable populations – are as follows.

Two guidelines on HIA of projects were developed in which the SDH were presented in such a way that the different professionals involved would understand (Fig. 6) (19,20). The guidelines for projects subject to EIA also include items inherent to the environmental assessment of projects (for

example, air quality and noise level). In those relating to urban-planning projects, the SDH are grouped according to their connection with various intervention areas in contexts, such as open spaces, mobility and accessibility, urban design, urban metabolism and social relationships.

Table 3. Features of and measures adopted in the Andalusian HIA methodology

Features	Measures adopted
Simplicity (ensuring ease of use by developers)	<p>Encouragement of developers to exploit results of other assessments (EIA, SEA).</p> <p>Development of thorough checklists (adapted to user jargon).</p> <p>Multistaging of assessment with progressive requirements, allowing for easier screening.</p>
Equity (empowering population groups)	<p>Inclusion of mandatory description of the distribution of impacts on population groups in the methodology.</p> <p>Inclusion of identification and description of especially vulnerable groups in the methodology.</p> <p>Emphasis placed on public involvement in decision-making.</p>
Universality (generalizing the validity of developers' results)	<p>Methodology based on SDH.</p> <p>Methodology based on best scientific evidence and tested procedures, such as quantitative risk analysis.</p> <p>Inclusion of internal and external testing to ensure reproducibility of results.</p>
Applicability (guaranteeing use of the methodology on a global scale)	<p>Methodology based on openly accepted data (from the Statistics and Cartography Institute of Andalusia) (Box 4).</p> <p>Making free software tools, such as R or QGIS, available.</p> <p>Development of online handbooks and supporting documents.</p> <p>Provision of on-demand training.</p>

Fig. 6. Guidelines on HIA implementation in Andalusia



Special attention was paid to the identification of vulnerable populations to ensure equity in decision-making. To this end, vulnerability-inducing characteristics were subdivided into different typologies. In addition, indicators were developed, the aggregation of which enables the identification of populations with these characteristics. Some examples are given in Table 4.

Table 4. Vulnerability-inducing characteristics of populations and examples of indicator groups

Vulnerability-inducing characteristics	Examples of indicator groups
Demographics	Total population Dependency ratio Age groups
Socioeconomic features	Unemployment ratio Training/education level
Support networks	Foreign population Single-person households
Environment	Air quality Noise levels
Services and facilities	Accessibility to green areas Accessibility to social, educational and health facilities
Health outcomes	Mortality Morbidity

Box 4. HIA and GIS

Technical advances, mainly the development of free- and open-source GIS, such as QGIS (24), are a great advantage to HIA.

In order to tap the full potential of GIS tools, reliable data must be available. The Statistics and Cartography Institute of Andalusia (IECA) updates the Spatial Distribution of the Population (SDP) in Andalusia (25) on a regular basis (for example, total population by sex, nationality or age group) in a regular 250 m grid cell. The IECA Longitudinal Statistics on Survival and Longevity (LSSL) (26) provide information about mortality ratios and socioeconomic data (for example, educational status and unemployment), also in a regular 250 m grid cell.

By using GIS, SDP, LSSL and other georeferences, available information can be combined to characterize population groups, identify vulnerable populations and assess the distribution of health impacts.

3.1 PHASES AND STAGES OF HIA METHODOLOGY IN ANDALUSIA

The HIA methodology in Andalusia consists of three phases and seven stages.

1. Description phase

- Stage 1: description of activity
- Stage 2: description of affected population and environment.

2. Assessment phase

- Stage 3: identification of potential effects on determinants of health
- Stage 4: preliminary analysis (decision on depth of the analysis)
- Stage 5: relevance of impacts
- Stage 6: in-depth analysis.

3. Concluding phase

- Stage 7: presentation of the conclusions of the assessment.

Table 5 lists the aims of each stage of the methodology.

Table 5. Phases, stages and aims of HIA methodology in Andalusia

Phase	Stage	Aim
Description	1. Description of the activity	To present relevant information related to the activity, including location.
	2. Description of affected population and environment	To identify the segment of the population that might be directly affected by the activity and the social, economic, environmental and health-related starting points, with a focus on: <ul style="list-style-type: none"> • vulnerable population groups and health inequities; • public perception of health and environment in the affected area; • participatory consultations.
Assessment	3. Identification of potential effects on determinants of health	To identify and characterize possible changes in health determinants resulting from the activity.
	4. Preliminary analysis	To assess the probability of relevant health effects in the affected population and inequities in the distribution of these effects.
	5. Relevance of impacts	To decide whether to carry out an in-depth analysis through a semiquantitative estimation of the impacts.
	6. In-depth analysis	To describe and prioritize the impacts on population health and propose additional measures, the ultimate goal being to maximize the positive and minimize the negative health impacts.
Concluding	7. Conclusions	To provide the results of the assessment in an easy-to-read document.

This orderly iterative process affords the possibility of backtracking at any given time to rectify the analysis. Not all stages are always necessary; the importance of the activity determines the depth of assessment required. In addition to the methodology (23), detailed explanations on how to address each stage of the HIA process, as well as checklists for stages 3 and 4, are found in the guidelines on HIA implementation in Andalusia (19,20). Furthermore, several supporting documents are available on the HIA website (21).

The key stage in defining the depth of the assessment is the so-called preliminary analysis (stage 4), during which the following elements are assessed in accordance with a series of tables and scales:

- possible health effects (direct and indirect; positive and negative) that may cause changes in the system;
- existing mechanisms for optimizing these impacts;
- potentially affected population with a focus on vulnerable groups and unevenly distributed impacts;
- public perception of unevenly distributed impacts and the fostering of public involvement by the developer.

Annex 2 summarizes the methodology for the preliminary analysis of health impacts included in the HIA guidelines (19,20).

Decision-making rests upon an assessment of the degree to which these elements necessitate carrying out a further in-depth study of the impacts, balancing their relevance (intensity, interest of the population affected) with uncertainty about the impacts and the resources available. The convenience of performing a quantitative analysis would, therefore, be justified for the impacts selected through this procedure; for other impacts, a qualitative description would suffice.

If a qualitative description is deemed insufficient, a semiquantitative estimate of the relevance of impacts caused by the various design alternatives would be carried out, or additional proposed measures considered, using the same indicator. The results obtained from the different alternatives enable the selection of those most suitable and/or those that are progressing in the right direction. Nevertheless, a comparison of standards – which would provide an accurate estimate of the desired levels – would still be necessary to assess the real validity of the proposals. Some indicators and standards are provided in the two guidelines supporting the HIA methodology (19,20,23).

Decisions made in stages 1, 2 and 3 will influence the design of the semiquantitative analysis. Consequently, the study of the affected population will provide the information necessary to direct developers in their choice of indicators and/or the best way of measuring them. It will also allow them to

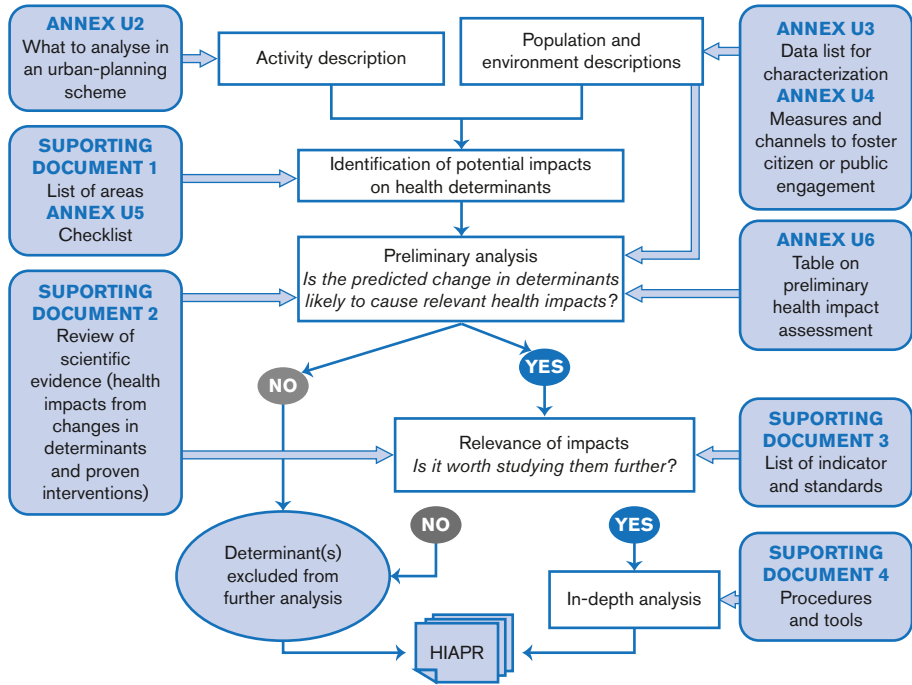
focus on identified vulnerable groups and/or other issues of most concern. When a problem stems from an uneven distribution of the effects among different areas, it may be particularly interesting to conduct a subsequent analysis on a per-area basis to measure the problem properly.

Finally, if the ideal and/or required levels are not achieved, an in-depth analysis, involving the use of tools (such as risk assessment), will be indispensable (stage 6). The objective of this stage is to carry out a critical analysis, based on a synthesis and assessment of the compiled information. The aim is to describe the possible impacts of the activity on the health of the population. In any case, the validity of this procedure depends on the strength of the scientific evidence and the logical reasoning behind the estimates.

Fig. 7 gives an overview of the documentation supporting HIA of urban-planning projects in Andalusia.



Fig. 7. HIA methodology in Andalusia: annexes and supporting documents relating to HIA of urban-planning projects



3.2 HIA METHODOLOGY: ELEMENTS OF SUCCESS

The implementation of this methodology (23) over the last five years has been a very positive experience. It has shown it to be:

1. flexible and effective, having adapted seamlessly to all kinds of activities regardless of the environment in which they took place and the relevance of their impacts;
2. easy to put into practice: virtually all developers (and their collaborators) use it, tailoring it to suit their needs;
3. useful in raising awareness about the importance of health-related decisions made outside the sphere of health care: developers are gradually phasing out the concept of health as the mere absence of disease.

4. HIA implementation: organizational challenges

The last aspect to consider is how to design HIA implementation, which is a lengthy process. In fact, for many of the activities it is a continuous process.

4.1 MAIN CHALLENGES

The main challenges met in implementing HIA in Andalusia are described in Table 6.

Table 6. Main challenges to HIA implementation in Andalusia

Source	Challenges
Sectoral reserves (promoters and administrations mandated to foster competitiveness and seek public opinion on economic development)	Unnecessary restrictions to development resulting in undue disadvantage in comparison to other regions. Administrative barriers (contrary to the spirit of economic freedom). Bureaucratic requirements (affecting procedures and deadlines).
Opposition from substantive organs (environmental, urban and municipal)	Perception of HIA as an interference in and indirect criticism of their work, or limitation of their power. Increased bureaucracy and lack of coordination in procedures. Uncertainty about the interpretation of, and lack of consistency in, pronouncements.
Internal opposition	Increase in expenses and restructuring of personnel. Training of professionals reluctant to increase their workload. Management of workload.

Developer opposition was apparent even in the case of non-profit activities and/or projects and plans with potentially favourable HIAs, such as sectoral plans and urban-planning activities. Furthermore, developers regarded HIA as a redundant exercise since, according to their understanding, the environmental assessments they conducted for the Regional Ministry for

Environment included health-related issues. Unfavourable economic conditions elicited claims from the developers that conducting HIAs would only worsen the situation.

Another major obstacle to HIA implementation was that there was little collaboration among the different administrations from the start. Issues raised were that it would entail:

- restructuring both human and material resources (implementation was, in fact, carried out without an increase in budget);
- increased workload;
- having to abide by legally binding regulations;
- having to work in new (and unknown) fields with, in some cases, a high level of uncertainty about health-related effects in general.

4.2 SUCCESSFUL SOLUTIONS

There is no single or perfect solution. It is, however, possible to identify some questions that, according to experience in Andalusia, are essential to address if HIA is to be put into practice.

The first step to success is to encourage the involvement of the upper political and administrative levels of public health care. These levels are responsible for setting the priorities of the health administration and can mobilize resources.

To facilitate HIA implementation, it is necessary to ensure:

- political leadership and strategic alliances
- multilevel (political and technical) administrative coordination
- internal strategic planning
- advocacy and cooperation.

4.2.1 Political leadership and strategic alliances

How political leadership is conducted depends largely on the political agenda and the strategy (or strategies) devised by those wishing to pledge their support of HIA. The strategy proven to be the most effective is to advocate the inclusion of health among government priorities and the promotion of population value as a strategic element of political activity. There is wide social consensus on this.

Another fruitful strategy is to search for strategic alliances with groups with the same or similar goals (for example, health, environmental and sustainability goals reinforce each other in general terms). This is particularly true of citizen organizations as these entities are natural allies.

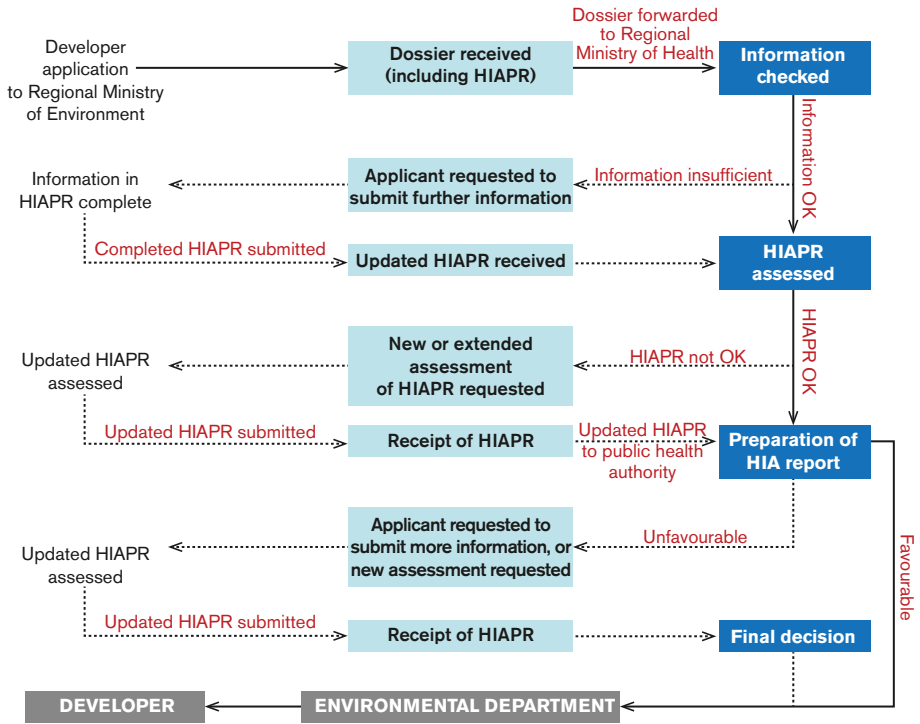
In any case, being prepared both to negotiate and reach agreement is of the utmost importance, as is defending the initial proposal, highlighting the advantages of HIA and minimizing or negating any perceived disadvantages. In Andalusia, most negotiations focused on the scope of the assessment, not on its mandatory and binding nature. In addition, a specific commitment was made to prevent the creation of new procedures and the extension of existing deadlines.

4.2.2 Multilevel (political and technical) administrative coordination

Administrative coordination cannot be achieved without multilevel meetings, normally with the participation of both the political and the technical levels. Despite some initial resistance, bottlenecks in the coordination of activity and management of documentation were resolved through organizational changes and the appropriate technology.

At the organizational level, in June 2015, the Environmental Prevention Directorate and the General and Public Health Directorate-General issued a Joint Instruction regarding the incorporation of HIA into environmental authorization procedures (27) (Fig. 8) (see also section 2.3). The aim of this instruction was to define the tasks of each organization, including deadlines and people in charge. It also established the possibility of submitting applications electronically, which has helped to speed up administrative procedures.

Fig. 8. HIA application process relevant to projects^a



Notes. ^aIn accordance with the Joint Instruction issued by Environmental Prevention Directorate and the General and Public Health Directorate-General in June 2019 on the incorporation of HIA into environmental authorization procedures (27). Health requirements, reports and decisions made by the public health authority are in dark blue.

In addition, there is the possibility of direct communication at the technical level, which is very helpful in dealing with any doubts that might arise during the process. This mechanism has proven to be useful in putting an end to conflicts and misunderstandings, and in facilitating joint work.

4.2.3 Internal strategic planning

The most sensitive issue relating to internal strategic planning involved the workforce. In this regard, measures were taken to:

- identify the ideal professional profile (knowledge, skills, attitudes) and specific training needs;
- organize the work optimally.

Work areas for which specific training is needed include, but are not limited to: SDH; regulations related to EIA and urban-planning assessment; GIS; quantitative risk analysis; the search for scientific evidence; and the description of vulnerable populations.

So far, in collaboration with the Andalusian School of Public Health and the Andalusian Institute of Public Administration, the regional HIA team has run four sessions of a workshop entitled, “Introduction to HIA” (Fig. 9) and training courses on: administrative procedures related to HIA; GIS applied to HIA; HIA networking in Andalusia; and health-risk assessment applied to HIA.

Fig. 9. Participants in workshop, “Introduction to HIA” (2016)

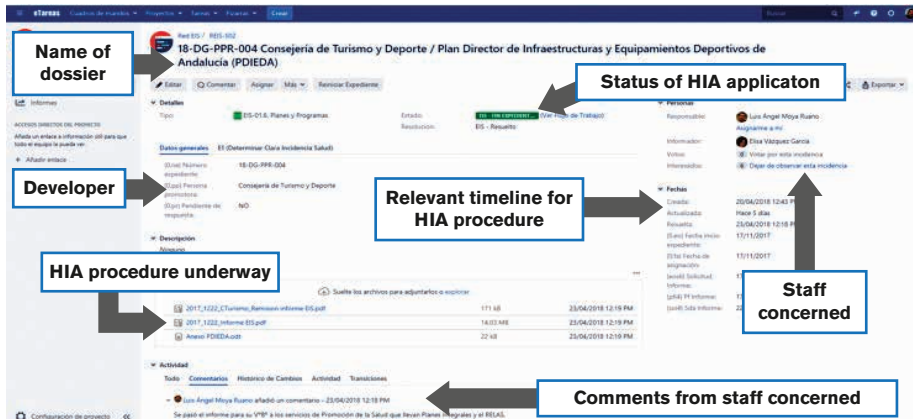


Source: Andalucía es Salud (28).

Regarding the internal organization of the work, nine multidisciplinary teams have been created, one in each province and one at the regional level, creating a HIA network across the region (Fig. 10). The teams comprise 6–8 members with various academic backgrounds who are specialized in some of the work areas mentioned above. The diversity of their viewpoints and personal experiences have contributed to enriching the contents of HIAs

and, thus, the quality of the reports. At the same time, it has been necessary to distribute the workload among different profiles to avoid overburdening certain departments.

Fig. 10. HIA networking in Andalusia



To ease knowledge transfer and ensure consistency in the assessment, the Regional HIA Team – in collaboration with the Andalusian School of Public Health – developed software to serve specifically as a case repository, with information on the processing status. The files can be reviewed by all staff working in the Regional and Provincial HIA Teams, which facilitates collaboration on assessments. The system allows for the adoption of new common criteria for the assessments, as well as the generation of data required to manage and monitor the work. This is done directly in the system, or by exporting the files to comma-separated values (CSV) files. Further internal operating procedures are currently being drafted.

Lastly, in March 2018, the General Directorate of Public Health Directorate General issued Instruction 03-2018, establishing criteria to improve and standardize the implementation of HIAs in Andalusia. The Instruction defines certain terms used for the purpose of HIAs, such as, “residential area” and “internal procedures”, and outlines different types of HIA reports.

4.2.4 Advocacy and cooperation

It is important to stress the need for continuous advocacy and dissemination activities to raise greater awareness about HIA, although activities aimed at creating facilitating mechanisms for promoters enjoy more popularity.

The most successful of these activities were the drafting of the HIA guidelines (19,20) and the establishment of a pre-consultation system, which allows anyone access to information about the scope and type of impacts and the recommended depth of analysis (Table 7). Two peer-reviewed articles on the institutionalization of HIA and its methodology were published in 2016 and 2017 (29,30).

Table 7. Summary of activities and key elements involved in the implementation of HIA in Andalusia

Activities	Key elements
1. Political leadership, including the search for strategic alliances	Inclusion of health among government priorities Strategic alliances among natural allies Negotiation Commitment to preventing the creation of new procedures and the extension of deadlines
2. Multilevel (political and technical) administrative coordination	Organization of interdepartmental work Use of available technologies Direct communication
3. Internal strategic planning	Professional profiles/training needs Internal organization
4. Advocacy and cooperation	Dissemination activities Development of supporting documents Development of pre-consultation procedure

5. Case studies on HIA in Andalusia

HIA has proven to be a successful tool for implementation of the HiAP strategy (9) in Andalusia by consistently improving the outcomes of examined projects.

In considering HIAs and population and health effects in environmental assessments (EAs), Andalusian HIA teams have processed over 1500 dossiers and produced more than 1000 HIA reports and reports on health effects. Table 8 gives an overview of work done since the HIA Decree (14) entered into force on 16 June 2016.

Table 8. Work related to HIA and health effects in EAs, Andalusia, 2015–2018

Type of procedure	Number of dossiers submitted ^a					Number of reports				
	2015	2016	2017	2018	Total	2015	2016	2017	2018	Total
HIAs – public/private projects	43	153	226	204	626	8	55	76	53	192
Pre-consultations – public/private projects	7	35	17	14	73	3	33	15	12	63
HIAs – urban-planning projects	10	28	77	116	231	0	13	30	79	122
Pre-consultations – urban-planning projects	21	30	58	52	161	20	29	53	47	149
HIAs – policy procedures (plans and programmes)	0	1	1	10	12	0	0	1	2	3
Total (HIAs)	81	246	378	396	1101	31	130	175	193	529
Population and health effects in EAs	40	152	221	152	565	36	142	189	111	478
Total (HIAs + EAs)	121	398	599	548	1666	67	272	364	304	1007

Note. ^aInvolves, at minimum, checking dossier information and, in case of public and private projects, verifying distance to residential areas.

The tools and methods used to achieve these results are described in the following case studies. These show how HIA enabled the consideration of issues previously neglected in decision-making processes, providing added value as compared to other types of impact assessments (such as, environmental- and social-impact assessments).

As will be seen in the first example, HIA also allows for greater transparency and accountability in public policies. The HIA report on the draft Andalusian Air Quality Strategy not only provided health outcomes (morbidity and mortality) but also turned them into monetary values, which can benefit negotiations with policy-makers who sometimes find standard health measures difficult to understand. This approach makes it possible to contribute to cost–benefit analyses and adhere to the European Commission guidelines on better regulation and public-policy impact assessment (31).

The second example relates to the food industry. In this case, the HIA focused on describing the affected population and singling out its vulnerable traits, using GIS and open social and demographic data. Combined with a study on the dispersion of air pollutants, the assessment was able to reveal inequalities in the distribution of impacts, thus propitiating the inclusion of additional emissions-abatement measures

HIA also helps to raise awareness in other sectors. The third case illustrates how a major change in the attitude of an urban-planning department of a large city was brought about. After some initial reserve, the municipality based its decision regarding the relocation of a social centre on the assessment that positive impacts on SDH could be expected. Based on a combination of the assessment and the results of a public consultation, a new location was chosen.

5.1 CASE STUDY 1. HIA OF POLICIES: DRAFT ANDALUSIAN STRATEGY ON AIR QUALITY

This case deals with the HIA of the draft Andalusian Strategy on Air Quality (ASAQ), specifically the version sent to the relevant departments of the Regional Government of Andalusia within the framework of the policy-approval procedure. (The draft ASAQ has since been approved.)

5.1.1 Stage 1. Policy description

ASAQ is a general framework for air-quality policy in Andalusia. It includes objectives, indicators, analyses and diagnoses on which the development of air-quality plans (AQP) in each air-quality assessment and management zone (hereafter “zone(s)”) will be based. It also contains a proposal on conducting evaluation and monitoring exercises through an indicator system.

An ASAQ diagnosis is based on data from the Andalusian Air Quality Monitoring Network (AAQMN), which is managed by the Regional Ministry of Environment. The Network includes the sectors responsible for pollutant emissions and suggests a group of reduction objectives for each zone, according to the situation.

The draft ASAQ described four objectives, including improvement of the well-being of Andalusian citizens by enhancing air quality, the main purpose being:

- to meet the legal limit values (LVs) in zones where this was not yet the case (the LV objective); and
- where the LV objective had been met, to adhere to more demanding limits, such as those included in the WHO air-quality guidelines for particulate matter, ozon, nitrogen dioxide and sulphur dioxide (WHO-AQG) (the Strategy objective) (32).



Table 9 lists some examples of the LV and Strategy objectives.

Table 9. Examples of ASAQ air-quality objectives, by pollutant

Pollutant	LV objective	Strategy objective
Sulphur dioxide (SO ₂)	Number of daily LV (125 µg/m ³) exceeding: maximum 3 times a year	12 µg/m ³ (upper assessment threshold (UAT) for vegetation protection, extrapolated to the annual average)
Nitrogen dioxide (NO ₂), annual average	Annual average: 40 µg/m ³	32 µg/m ³ (UAT 80% of LV)
Particulate matter less than 10 µm diameter (PM _{2.5}), daily average	Number of daily LV (50 µg/m ³) exceeding: maximum 35 times a year	25.6 µg/m ³ (UAT, 64% of LV)
Particulate matter less than 2.5 µm diameter (PM _{2.5}), annual average	25 µg/m ³	17 µg/m ³ (UAT, 70% of LV)

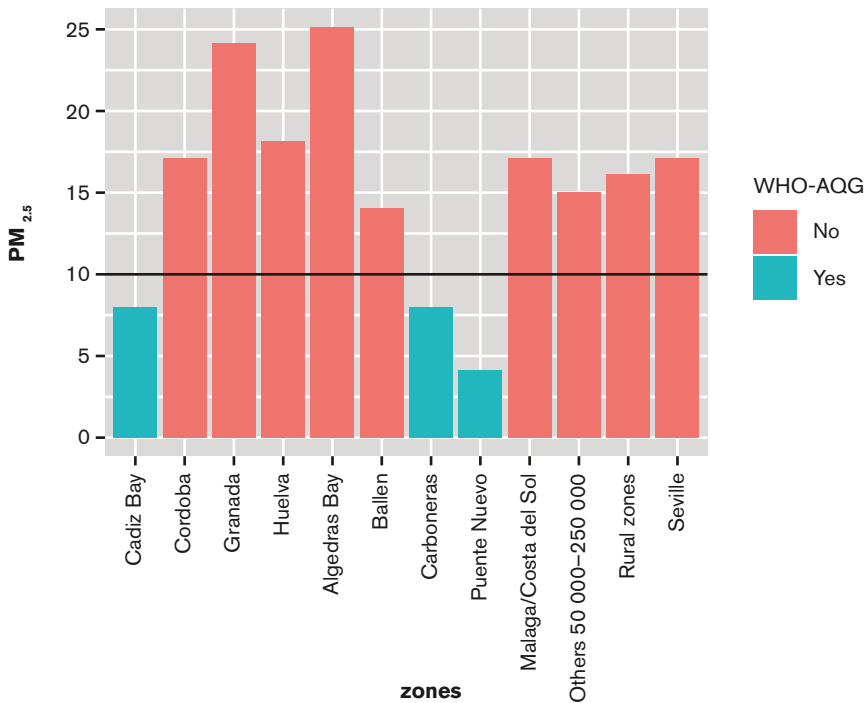
Source: draft Andalusian Strategy on Air Quality, Regional Ministry of Health of Andalusia, unpublished data, 2018.



Pictures provide by Turismo Andaluz

For HIA purposes, it was assumed that the implementation of ASAQ action would result in the reduction of air pollution to the Strategy-objective levels. In the case of $PM_{2.5}$, the aim is also to meet the limits set in WHO-AQG (32). Fig. 11 shows the worst $PM_{2.5}$ values measured in each zone in 2016 and 2017 compared to the LVs of the Strategy objective ($17 \mu\text{g}/\text{m}^3$) and WHO-AQG ($10 \mu\text{g}/\text{m}^3$) (32).

Fig. 11. Worst $PM_{2.5}$ LVs measured in each zone in 2016–2017, Strategy objective LVs ($17 \mu\text{g}/\text{m}^3$) and WHO-AQG LVs ($10 \mu\text{g}/\text{m}^3$)



Source: author's own compilation based on ASAQ data, using the ggplot-R package (33).

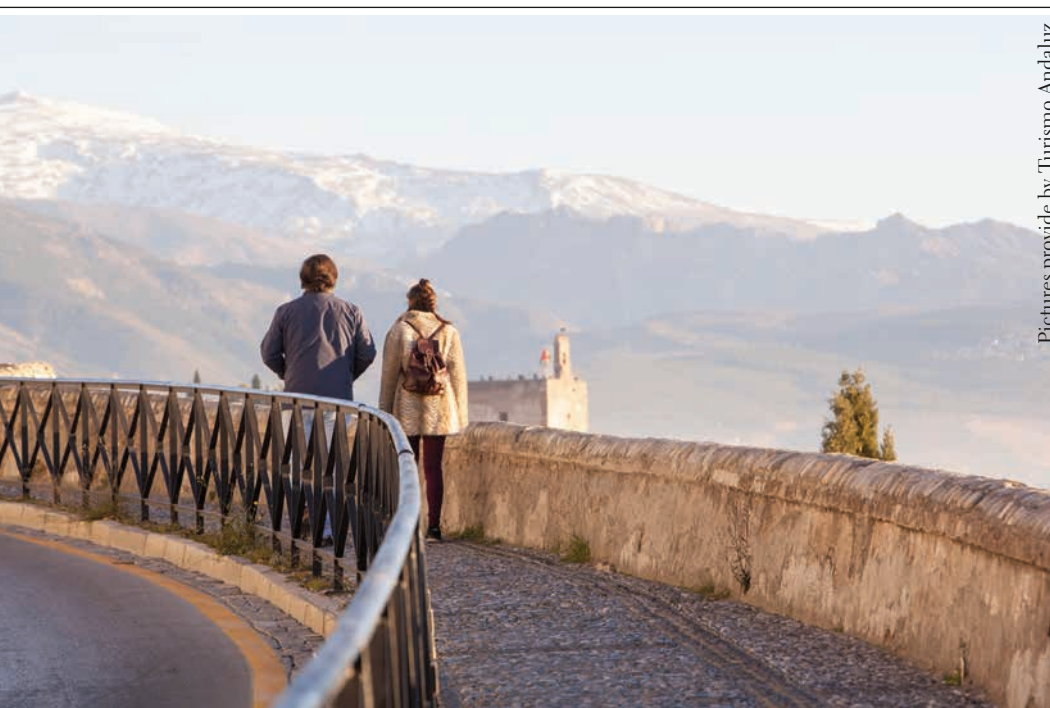
ASAQ actions are sorted by sector (for example, traffic, industry) or type of approach adopted (prevention, awareness or management). Implementation costs and expected emission reductions are also considered for each action, taking qualitative factors into account. Table 10 lists examples of the action groups and pollutants involved.

Table 10. Examples of ASAQ action groups and potential pollutants

Action groups (by sector)	Pollutants
Traffic	Particulate matter less than 10 µm diameter (PM ₁₀), nitrogen dioxide (NO ₂) or oxides (NO _x), carbon dioxide (CO ₂), lead (Pb).
Construction and demolition	PM ₁₀
Sea traffic	PM ₁₀ , NO ₂ /NO _x and SO ₂
Airports	PM ₁₀ and NO ₂ /NO _x
Agriculture	PM ₁₀ and NO ₂ /NO _x
Industry	PM ₁₀ , NO ₂ /NO _x , SO ₂ , CO ₂ , arsenic (As), cadmium (Cd), nickel (Ni), benzene and benzo(a)pyrene.
Residential/business/institutional	PM ₁₀

Source: draft Andalusian Strategy on Air Quality, Regional Ministry of Health of Andalusia, unpublished data, 2018.

The following HIA stages were based on the actions and objectives proposed in the draft ASAQ.



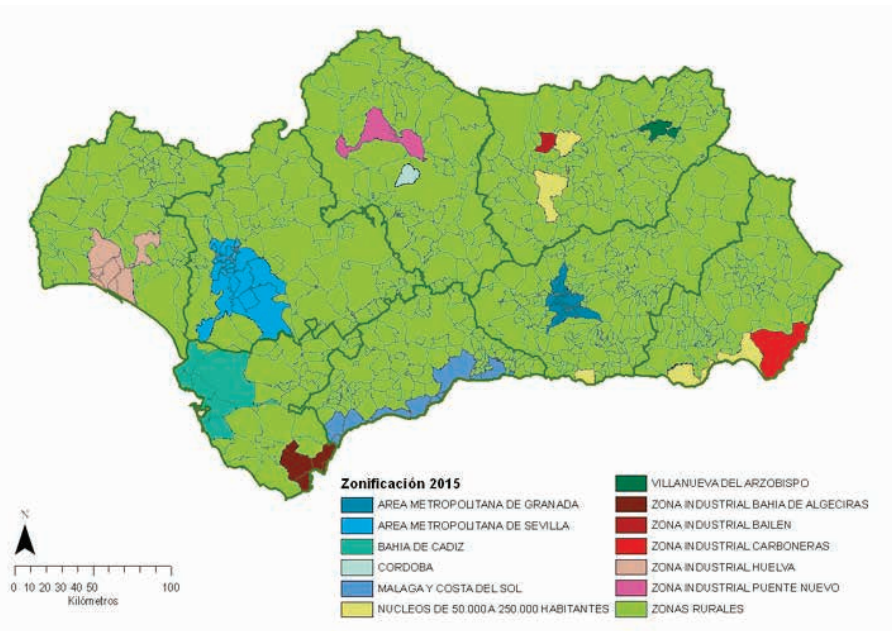
Pictures provide by Turismo Andaluz

5.1.2 Stage 2. Population and environment descriptions

ASAQ does not include real population and environment descriptions, leaving these to be developed in future AQPs. With respect to the environment description, an air-quality diagnosis (including a study on pollutant sources) was carried out for each zone within the framework of ASAQ. The division of Andalusia into zones was based on topographical studies, population characteristics, economic activities, meteorology, land use, nature-protection areas and atmospheric emissions.

There are 13 zones in Andalusia and, according to information from the Regional Ministry of Environment, population descriptions will be included in their AQPs (Fig. 12).

Fig. 12. Air-quality assessment and management zones, Andalusia, 2015

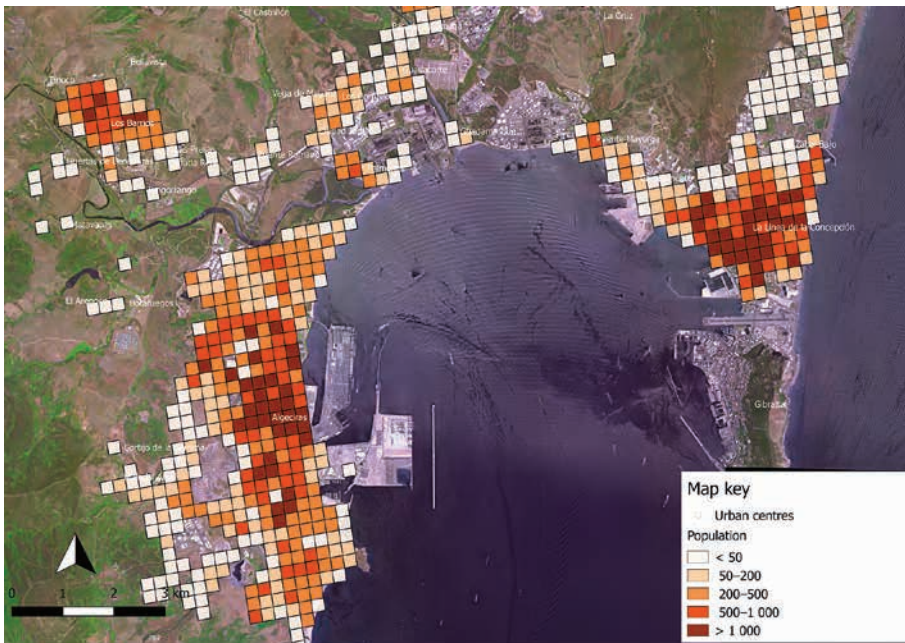


Notes. Kilómetros = kilometres; Zonificación = zoning; Área Metropolitana de Granada = Metropolitan area of Granada; Área Metropolitana de Sevilla = Metropolitan area of Sevilla; Bahía de Cádiz = Bay of Cadiz; Málaga y Costa del Sol = Malaga and Costa del Sol; Núcleos de 50 000 a 250 000 habitantes = clusters of 50 000 to 250 000 inhabitants; Zona industrial = industrial zone; Zonas rurales = rural zones. 50 000 to 250 000 inhabitants; Zona industrial = industrial zone; Zonas rurales = rural zones.

Source: Regional Ministry of Environment of the Government of Andalusia.

In collaboration with the Regional Ministry of Environment, the HIA team chose the industrial zone of Algeciras Bay to illustrate how an environment description for inclusion in an AQP should be elaborated. This zone, located near the Strait of Gibraltar, is the main industrial centre in Andalusia (and the second largest in Spain). It consists of four municipalities with over 230 000 inhabitants (2017) (34). The population of Algeciras Bay is concerned about the health effects of pollutant exposure (35) (Fig. 13).

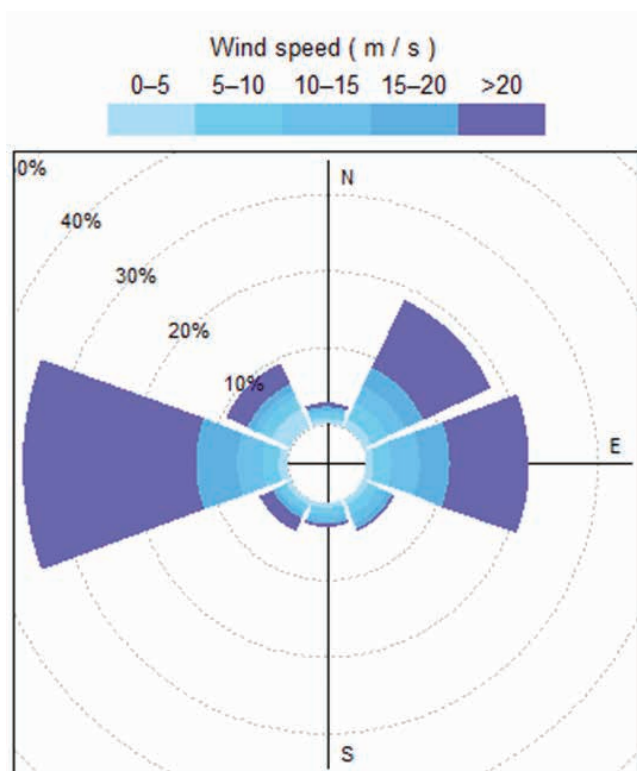
Fig. 13. Overview of Algeciras Bay and population distribution (scale 1:60 000)



Source: author's own compilation based on IECA data.

According to the draft ASAQ, the chemical compositions of particulate matter show that the main emission sources are the petrochemical industry and power plants, while traffic is not very relevant. Algeciras Bay is also prone to high-speed winds with special patterns and fixed directions (Fig. 14).

Fig. 14. Wind rose in the industrial zone of Algeciras Bay, 2005–2013

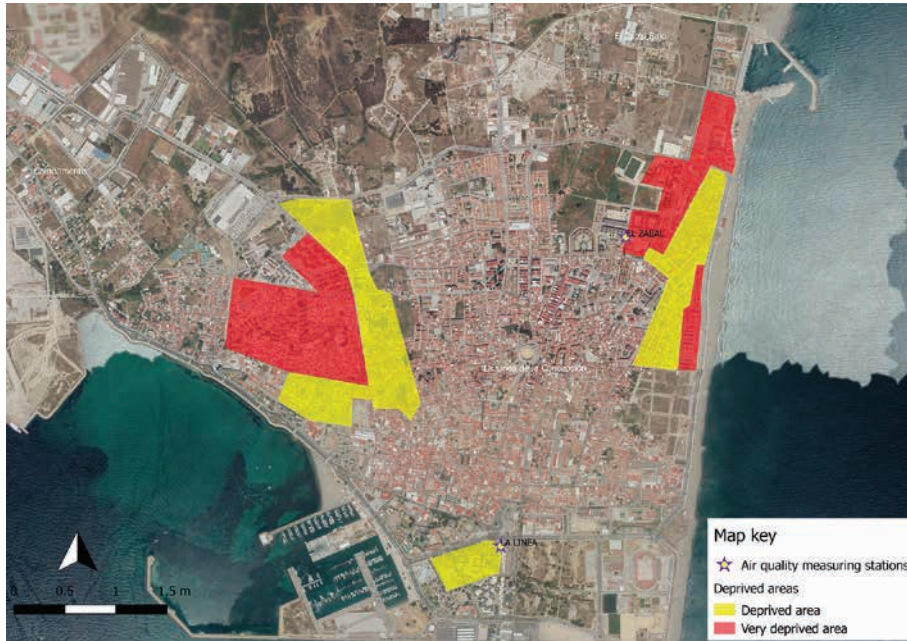


Source: author's own compilation based on AAQIM data, using open-air R package³ (36).

A comparison of the population of Algeciras Bay with that of the whole region revealed that, in the former, the education level was lower, the population was slightly younger and morbimortality among older adults was higher. For the purpose of the HIA, the main finding relating to the population in this zone was that there are several disadvantaged areas; these are found mainly in Linea de la Concepcion, which is located east of the main industrial area (in the direction of prevailing winds from this area) (Fig. 15).

Regarding public participation, the draft ASAQ was posted on the website of the Regional Ministry for Environment, providing the public with the opportunity to comment on it. In addition, the Regional Ministry organized designated conferences and meetings with the participation of the nongovernmental organizations and city councils mainly involved.

Fig. 15. Disadvantaged areas in La Linea de la Concepción (scale 1:15 000).



Source: author's own compilation based on IECA data and a study on vulnerability in Andalusia (37).

5.1.3 Stage 3. Impacts on SDH

Using the Andalusian HIA methodology (23), the impact of ASAQ-related action on the different health determinants was assessed in two steps: (i) each action was checked for potential health effects and it was assumed, as established in the draft ASAQ, that these actions would be implemented successfully; (ii) the relevance of the impact on health determinants was evaluated, using the checklist included in the HIA guidelines for projects subject to EIA (19,20).

Examples of ASAQ-related action with a potential impact on health determinants are given in Table 11.

Table 11. Examples of ASAQ-related action with potential impact on SDH

Health determinants	ASAQ action
Environmental health determinants	
Outdoor air	All ASAQ-related action
Noise and vibrations	Emissions control in industrial facilities Improvement of energy efficiency Introduction of traffic restrictions
Waters	Emissions control at industrial facilities Improvement of energy efficiency Substitution of ship fuels
Soils	Action to improve transport infrastructures Emissions control at industrial facilities Improvement of energy efficiency Introduction of traffic restrictions
Biological agents	Emissions control at industrial facilities Improvement of energy efficiency Introduction of traffic restrictions
Socioeconomic factors/social coexistence	
Local employment and economic development	Improvement of transport infrastructures Pedestrianization of cities
Access to public services	Promotion of public transport
Social exclusion and uprooting	Not addressed in draft ASAQ
Other health determinants	
Physical activity	Pedestrianization of cities Promotion of public transport Development of sustainable-mobility plans
Improvement of gathering places	Pedestrianization of cities Action towards traffic restrictions
Accident rate	Promotion of public transport Pedestrianization of cities Improvement of transport infrastructures Introduction of traffic restrictions
Landscape	Pedestrianization of cities

After identifying the health determinants that might be influenced by ASAQ-related actions, the relevance of their potential impacts were qualitatively

evaluated in accordance with the guidelines on HIA implementation in Andalusia (19,20). This entailed rating the potential impacts as high, medium or low (taking into account the overall change in the health determinants resulting from all actions). Three aspects were evaluated:

- probability – the likelihood that policy action would bring about a significant change in the health determinant;
- intensity – the highest level of change in the health determinant as a result of policy action;
- permanence – the potential degree of difficulty in subsequently modifying the changes.

The Regional HIA team evaluated all the determinants, selecting those classified as significant for further analysis. These were: outdoor air; local employment and economic development; and social exclusion and uprooting. As the actions taken could have strong, long-lasting effects on these three health determinants, this analysis is still ongoing.

The checklist of impacts of ASAQ-related action on health determinants and their global significance is shown in Table 12.

Table 12. Checklist of impacts of ASAQ-related action on health determinants and their global significance

Health determinants	Probability (high/medium/low)	Intensity (high/medium/low)	Permanence (high/medium/low)	Globally significant? ^{2a}
Environmental health determinants				
Outdoor air	High	High	High	Yes
Noise and vibrations	Medium	Medium	Low	No
Waters	Low	Low	Medium	No
Soils	Low	Low	High	No
Biological agents	Low	Low	Low	No

Table 12 contd

Health determinants	Probability (high/medium/low)	Intensity (high/medium/low)	Permanence (high/medium/low)	Globally significant? ^a
Socioeconomic factors/social coexistence				
Local employment and economic development	High	Medium	Medium	Yes
Access to public services	Medium	Low	Low	No
Social exclusion and uprooting	High	High	High	Yes
Other factors				
Physical activity	Low	Medium	Medium	No
Spaces for coexistence	Low	Low	Low	No
Accident rate	Low	Low	Low	No
Landscape	Low	Low	Low	No

Note. ^aClassification of the health determinants as globally significant (or not) was carried out in accordance with the guidelines on HIA implementation in Andalusia (Annex P-7, “Checklist to identify impacts on health determinants”). In addition, a health determinant must be classified as globally significant if one of the following criteria is fulfilled: (a) the detection of a sensitivity or concern related to the health determinant; and (b) the observation of an uneven distribution of changes in the health determinant within the affected population (18).

5.1.4 Stage 4. Preliminary analysis

This aim in this stage is to evaluate the possibility of significant health effects. Annex P-8 of the guidelines on HIA implementation in Andalusia regarding projects subject to EIA (preliminary analysis) (20) includes a weighted qualitative evaluation of factors relating to both policy and population.

The determinant, outdoor air, was subdivided into four areas, representing pollutants that have exceeded some reference values in Andalusia in recent years: particulate matter (PM₁₀ and PM_{2.5}); ozone (O₃); nitrogen dioxide (NO₂); and sulphur dioxide (SO₂). Table 13 shows the results of the analysis of these pollutants, as well as that of the determinant, local employment and economic development. In accordance with the Andalusian HIA

methodology (20,23), an analysis of the health determinant, social exclusion and uprooting, was conducted within the evaluation of population factors. This was done when analysing the health impact of the changes in each determinant on vulnerable groups, as well as the potential inequities in their distribution.

The analysis indicated that, depending on the zone, future AQPs should include an investigation of impact relevance and, where appropriate, an in-depth analysis. In case of SO₂, LV exceedances only affect a small area and measures to control them have been identified. Therefore, they have been deemed as “not significant” (at the regional level).

Table 13. Checklist for preliminary health-impact analysis^a

Health determinants/associated areas	Policy factors				Population factors					
	Potential effect ^b	Certainly	Measures	Decision ^b	Total population	Vulnerable groups	Unequal distribution	Public concern	Decision ^b	Is the global impact significant?
Environmental factors										
Outdoor air (PM ₁₀ , y PM2.5 exposure)	High	High	Medium	Medium	High	High	High	High	High	Yes
Outdoor air (O ₃ exposure)	Medium	High	Medium	Medium	Low	Low	Medium	Low	High	Yes
Outdoor air (SO ₂ exposure)	Medium	High	Medium	Medium	Low	Low	Low	High	High	No
Outdoor air (NO ₂ exposure)	Medium	High	Medium	Medium	High	Medium	Medium	Low	High	Yes
Socioeconomic factors/social coexistence										
Local employment and economic development	Medium	Medium	Medium	Medium	Low	Low	Medium	Low	Medium	No
Other factors										
–	–	–	–	–	–	–	–	–	–	–

Notes. ^aDecisions are based on the lowest value among the three policy variables and the highest value among the four social and environmental variables (see Annex 2 for further information). ^bPotential effect is assessed according to level of pollutant exposure.

5.1.5 Stage 5. Relevance of impacts

As mentioned in chapter 3, this stage involves a semiquantitative analysis of health impacts, using standards. The aim is to decide whether an in-depth analysis should be carried out.

The selected indicators were the LV and Strategy objectives. It was decided that, in cases where there was more than one indicator, an in-depth analysis would be carried out.

$$\text{Indicator zone } I = \frac{\text{Maximum level of pollutant in zone } I}{\text{Objective levels}}$$

The results of the semiquantitative analysis showed the need to conduct in-depth analyses of particulate matter and ozone in most zones. For the purpose of the HIA of the draft ASAQ, this was done for the industrial zone of Algeciras Bay only (as an example), taking account of the health effects of exposure to PM₁₀, the main pollutant in this area.

5.1.6 Stage 6. In-depth analysis

An in-depth analysis usually involves a quantitative analysis (if possible). In this case, the first step was to carry out an air-pollution health-risk assessment (AP-HRA).¹

The quantitative analysis was performed by comparing measured average annual PM₁₀ levels in 2005–2013 and two counterfactual levels:

- scenario 1: ASAQ Strategy objective: annual average PM₁₀: 25.6 µg/m³
- scenario 2: WHO-AQG (32) objective: annual average PM₁₀: 20 µg/m³.

The health outcome was mortality in adults (no external causes) (age 30+) in 2005–2013. AIRQ+, a tool developed by the WHO Regional for Europe was also used (38). AirQ+ requires users to upload their own data for the

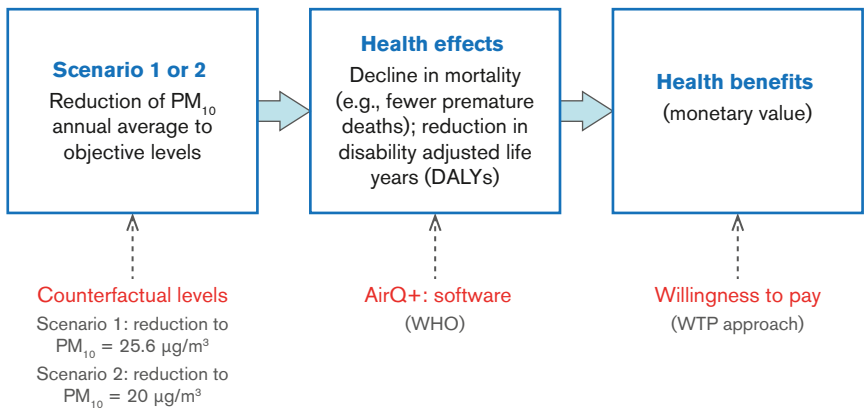
¹ Further information about AP-HRA can be found in the WHO publications, *Ambient air pollution: a global assessment of exposure and burden of disease* (2016) (42) and *Health risk assessment of air pollution: general principles* (2016) (43).

population studied (air quality, population and health, for example, baseline rates of health outcomes) and includes concentration–response functions for several pollutants (38,39).

In the second step, the HIA team turned health outcomes into monetary values. To this end, the willingness-to-pay approach was used (40,41) and results were obtained in terms of benefit to health.

Fig. 16 summarizes the methodology used for the in-depth analysis.

Fig. 16. Methodology used for in-depth analysis of health determinant, outdoor air, and subdeterminant, exposure to particulate matter PM₁₀



The results can be summarized as follows. If people had been exposed in 2005–2013 to the two counterfactual levels rather than the actual levels measured in that period, the annual average health gains would have amounted to € 54.6 million in scenario 1 and € 365.8 million in scenario 2 (Table 14).

Table 14. Results of in-depth analysis of health determinant, “outdoor air” and subdeterminant “exposure to particulate matter-PM₁₀”

Outcome (unit, period)	Scenario 1. counterfactual: Strategy objectives	Scenario 2. counterfactual: WHO-AQG objectives
Health effects (premature deaths, annual average in 2005–2013)	22.6 (IC 95%: 14.8, 29.9)	148.2 (IC 95%: 97.6, 194.6)

Outcome (unit, period)	Scenario 1. counterfactual: Strategy objectives	Scenario 2. counterfactual: WHO-AQG objectives
Health gains due to morbimortality (€ million, annual average in 2005–2013)	54.6 (IC 95%: 35.7, 72.1)	365.8 (IC 95%: 240.9, 480.3)

5.1.7 Stage 7. Conclusions

ASAQ-related action will have a large impact on the health of the Andalusian population. With the aim of developing the Strategy, the HIA report established the following.

- AQPs shall characterize the affected population and vulnerable populations within this population.
- AQPs shall focus as many activities as possible on vulnerable populations (for example, by prioritizing action in disadvantage areas, such as those with heavy traffic).
- AQPs shall include action to increase public awareness of the relevance of the domestic, business and institutional sectors as sources of emissions (for example, in Seville and the metropolitan area, emissions amount to 53.7%). The HIA report strongly recommends the use of participatory measures from the start of the AQP drafting process. Some useful



Pictures provide by Turismo Andaluz

suggestions are provided in the guidelines on HIA implementation in Andalusia relating to projects subject to EIA (Annex P-6) and urban-planning projects (Annex U-4) (19,20).

- AQPs shall include a cost–benefit analysis, including health gains from air-quality improvement for each pollutant exceeding the selected standard in stage 5 of the HIA (relevance of impacts).

The above conclusions were reflected in the final version of ASAQ.

5.2 CASE STUDY 2. HIA OF PROJECTS: MANUFACTURING OF OLIVE OIL AND TABLE OLIVES

The second case relates to a project on the manufacturing of olive oil and table olives. The complete process included requests from the public health authority for more information with respect to two health-impact appraisals (HIAPRs). The process followed is illustrated in Fig. 8 (chapter 4).

5.2.1 Stage 1. Project description

The developer’s application involved a project on substantially modifying the existing facilities (Fig. 17).

Fig. 17. Current situation, future situation and aim of project



According to the HIAPR, the project would entail:

- an increase in the consumption of drinking-water, as well as in noise levels and air-pollutant emissions (olive stones are used as fuel in two steam boilers, which emit air pollutants 24/7 for three months of the year from

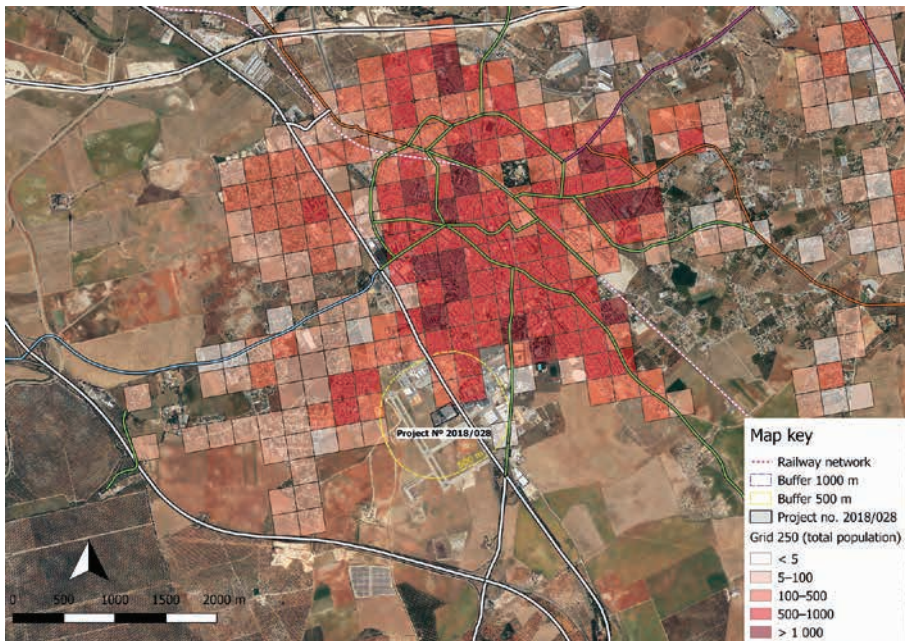
- the beginning of the olive-harvesting season);
- the generation of direct and indirect employment.

5.2.2 Stage 2. Population and environment description

This stage of the project involved activity close to a national road, which runs past a population centre with almost 100 000 inhabitants. According to the HIAPR, the number of people living in the centre had increased over the last 40 years due to industrial activity and its proximity to a large city. The population was relatively young as compared to the population pyramid for Andalusia.

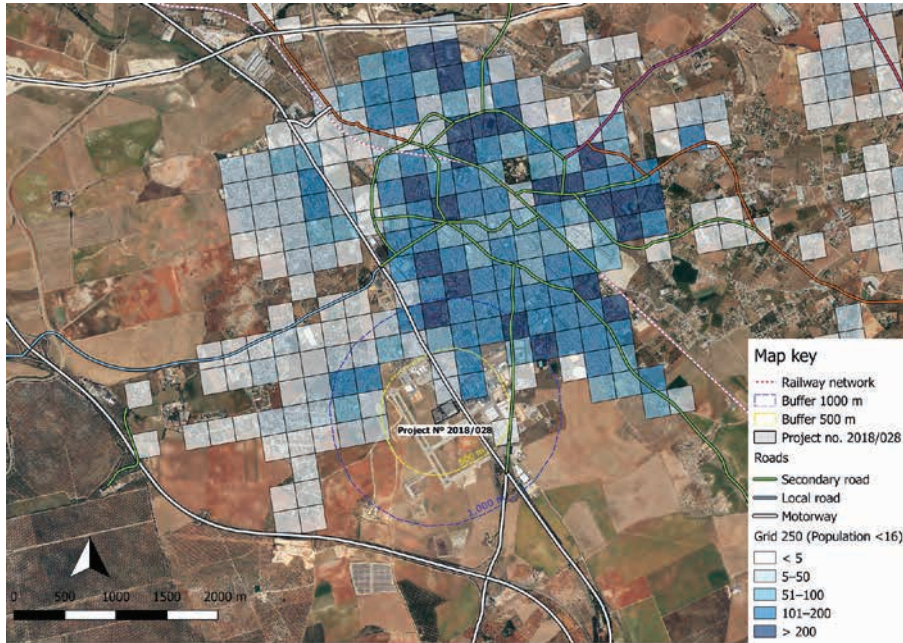
Fig. 18 gives a general overview of the population centre and the distribution of the population living within 500 m and 1000 m from the olive-oil manufacturer; 7475 people (5.64% of total population) were residing within a 1000 m radius. The distribution of the young (< 15 years) and older (> 65 years) populations can be seen in Figs 19 and 20, respectively.

Fig. 18. Overview of population centre



Note. Total population grid 250 x 250 m (scale 1:30 000).
 Source: author's own compilation based on IECA data.

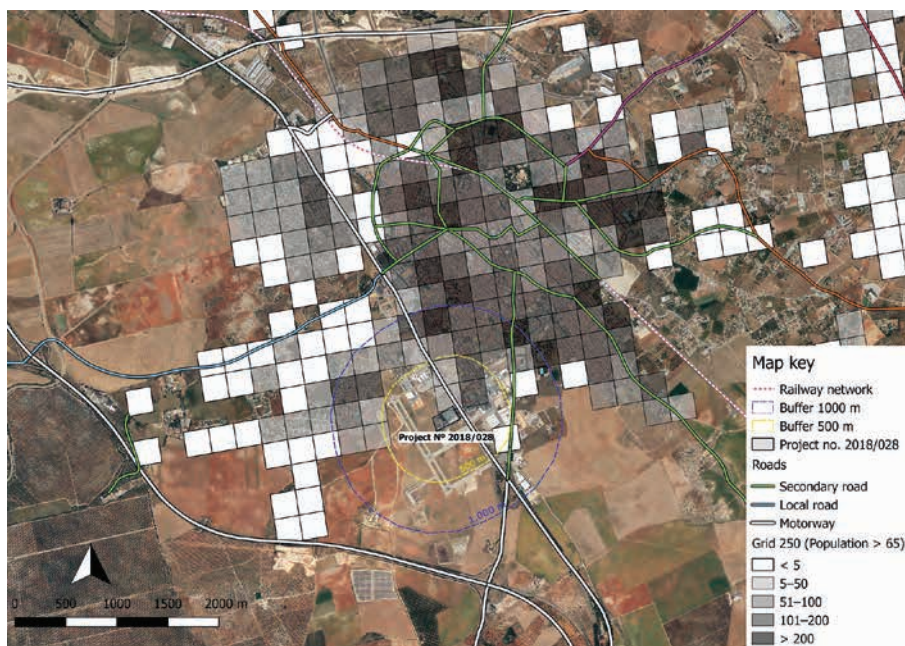
Fig. 19. Population map, youth (<15 years) (scale 1:30 000)



Source: author's own compilation based on IECA data.



Fig. 20. Population map, older people (65 years) (scale 1:30 000)



Source: author's own compilation based on IECA data.

The closest residential area was located around 150 m north of the project area. There were some urban infrastructures, as well as disadvantaged areas, within a radius of 1000 m (Table 15) (37). Consistent with a relatively young population, there were a number of educational facilities in the project area, as well as sports-equipment facilities and primary-health-care centres (Fig. 21). Fig. 22 shows the disadvantaged areas, some of which had zones with relatively high mortality rates (Fig. 23).

Table 15. Facilities near the project area

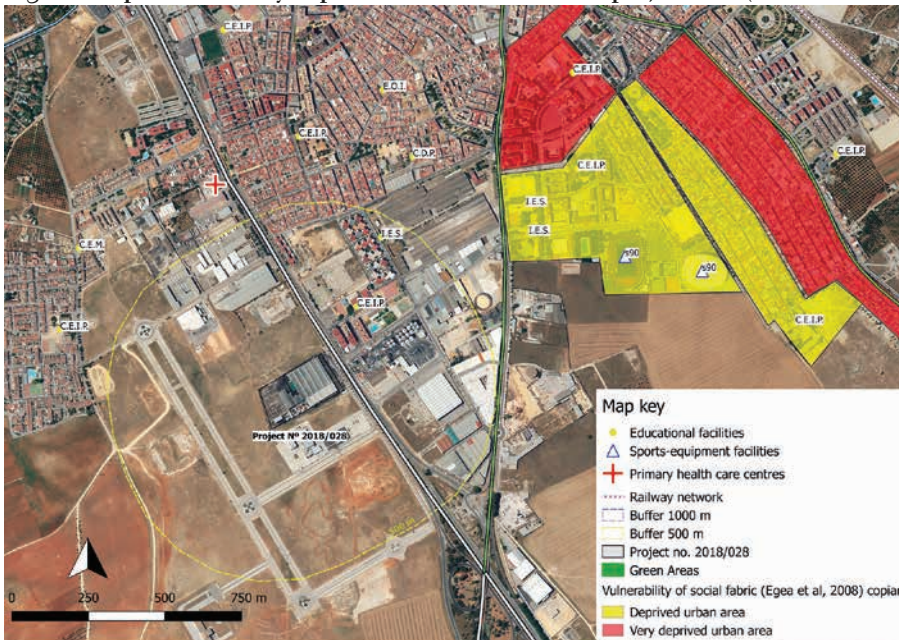
Facilities	No. of facilities	Distance(s) to project area
Nursery and primary schools (ages 3–11)	3	317 m, 750 m, 778 m
Secondary schools (ages 12–17)	3	531 m, 914 m, 952 m
Primary-health-care centre	1	750 m
Official school of languages	1	981 m
Sports-equipment facilities	2	1170 m, 1391 m

Fig. 21. Map of facilities (scale 1:10 000)



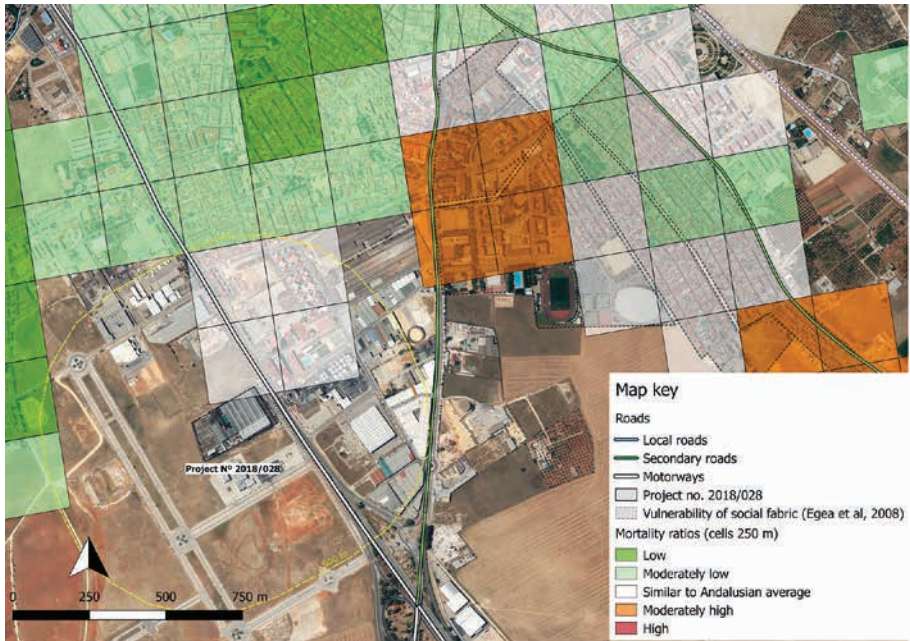
Source: author's own compilation based on IECA data.

Fig. 22. Deprived and very deprived urban areas close to project area (scale 1:10 000)



Source: author's own compilation based on IECA data and a study on vulnerability in Andalusia (37).

Fig. 23. Overall mortality ratio (cells 250 m) in the project area compared to average for Andalusia (scale 1:10 000)



Source: 2002–2013 Andalusian Longitudinal Statistics, IECA.

As required, the HIAPR included an environmental characterization showing the prevailing winds, an aspect relevant to increased emissions. This showed that the population centre lay in the direction of prevailing winds 26.5% of the year (Fig. 24).

The participation process carried out by the developer, which entailed the issuance of public information within EIA procedures, was classified as basic, according to the HIA guidelines (19,20).

Fig. 24. Wind rose of project area



Source: project HIAPR – reproduced by permission of the project developer.

5.2.3 Stage 3. Impacts on determinants of health

According to the first HIAPR, none of the health determinants was affected by the project. Probability, intensity and permanence were all considered low. The developer commented that it was not possible for the project to have any health impact since the environmental limits for emissions had been met. This conclusion, however, did not take account of the surrounding communities, or the existing levels of pollutants in the area. This is a mistake commonly made by developers in evaluating health effects in environmental assessments.

The HIA team did not agree with the assessment and requested further information and a new assessment. Based on prior experience and scientific evidence, the following determinants were expected to undergo changes as a result of the project:

- environmental determinants – outdoor air, noise, drinking water, chemical safety, biological agents, and waste;
- socioeconomic factors/social coexistence – local employment and economic development, people at risk of social exclusion.

5.2.4 Stage 4. Preliminary analysis

The second HIAPR included a more comprehensive analysis of the health determinants and a preliminary analysis of the effects of the project on the determinants selected in stage 3. The developer explained and justified the probability of relevant health effects in the affected population and, for the first time, took into consideration the inequity associated with the distribution of these effects. According to the second HIAPR, none of the determinants was significant.

The HIA team agreed with the second HIAPR regarding all but two of the determinants, namely:

- outdoor air, due to the potential short-term effects of particulate matter less than $10 \mu\text{m}/\text{m}^3$ (PM_{10});
- noise, owing to the potential health effects derived from night work.

From the HIAPR, it was not possible to determine whether there had been any significant health impact or not. Therefore, the HIA team requested further information and/or another assessment to determine whether it was necessary to carry out a relevance-of-impact assessment (stage 5 of the HIA process). Without clarification, the HIA report would be unfavourable.

In requesting further information, the HIA team specified how the analysis should be carried out. A relevance-of-impacts assessment should be conducted in residential areas and areas in which vulnerable people may be living (Table 14, Fig. 22). In assessing outdoor air and noise, the developer should also take the existence of nearby deprived areas into consideration in the HIAPR (Box 5).

Consequently, the developer submitted a third HIAPR, which included the results of the relevance-of-impacts analysis and – in the assessment of the health determinant, “employment and economic development” – information regarding potential future job creation in nearby deprived areas.

Box 5. Assessing outdoor air in projects

According to experience in Andalusia, the most relevant health determinant to include when assessing projects is outdoor air. It is strongly advisable that HIA teams include at least one expert in this field. Tools, such as air-dispersion models and AP-HRA, can be very useful in addressing the potential health impacts of changes in exposure to air pollutants.

5.2.5 Stage 5. Relevance of impacts

As mentioned in case study 1, this stage involves a semiquantitative analysis of health impacts (using standards) to determine whether an in-depth analysis should be carried out. The developer (on the advice of the HIA team) selected two standards: noise and outdoor air.



Pictures provide by Turismo Andaluz

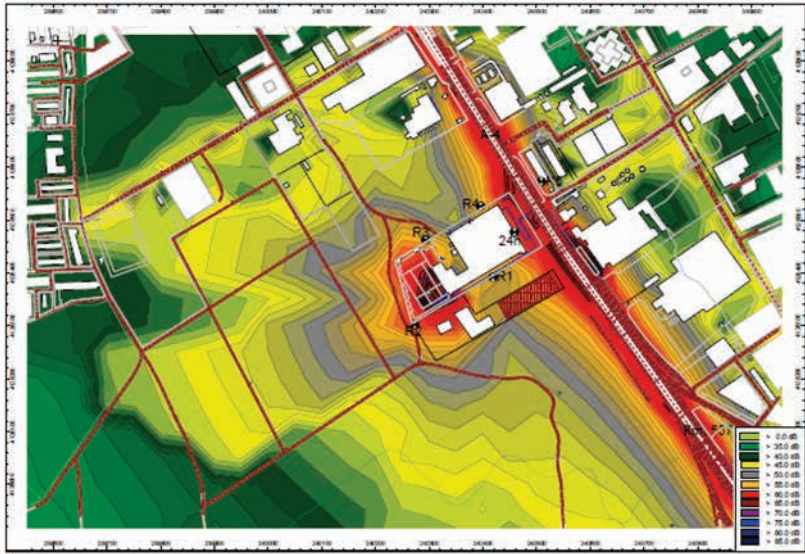
- *Noise*

The developer used Indicator 4 in Supporting Document 3 of the HIA guidelines (20), using a night-noise level of 40 dB as the standard (44), the condition being that the indicator must be less than one:

$$\text{Indicator 4} = \frac{\text{Noise background levels} + \text{project contribution}}{\text{Standard}}$$

The developer carried out an acoustic study to evaluate Indicator 4. Fig. 25 shows the noise map resulting from the study. Indicator 4 was less than one in the nearest residential area.

Fig. 25. Noise map from the acoustic study



Source: reproduced from the project HIAPR by permission of the project developer.

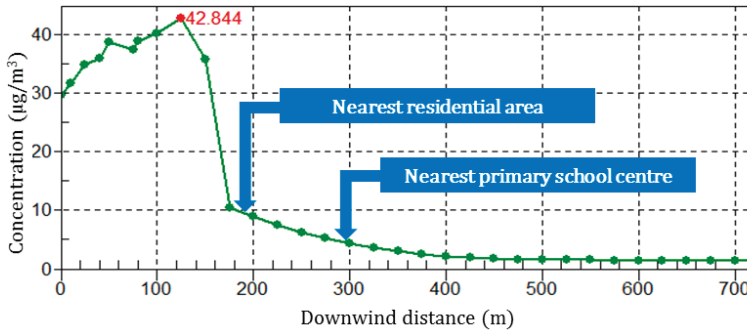
- *Outdoor air*

The developer used Indicator 2 included in Supporting Document 3 of the HIA guidelines (20), using a daily PM₁₀ exposure level of 50 µg/m³ as the standard (32). The selection of this indicator was based on the fact that the steam boilers are in use three months a year. In addition, fulfilling the daily standard levels would provide health protection in the long term since, theoretically, this would lead to meeting the annual LVs.

$$\text{Indicator 2} = \frac{\text{Pollutant background levels} + \text{project contribution}}{\text{Standard}}$$

To make these calculations, the developer used an air-screening dispersion model (Fig. 26), which resulted in an indicator level of less than one. It was, therefore, deemed unnecessary to carry out an in-depth analysis.

Fig. 26. Project contributions to PM10 levels, calculated according to distance from project area



Source: adapted from project HIAPR by permission of the developer.

5.2.6 Stage 7. Conclusions

The EIA of the project focused on compliance with legal emission LVs, whereas the HIA considered the potential exposure of the population to environmental health determinants. In addition, the EIA did not take SDH into account, whereas the developer included an assessment of the potential impacts of the project on them.

Although the HIA did not lead to changes in the project proposal, in the HIAPR, the developer:

- assessed the potential health impacts of the environmental sources of pollution adequately, taking the potential exposure of the vulnerable population into account;
- considered the effects of the project on SDH;
- incorporated the potential creation of jobs for nearby disadvantaged communities.

In addition, even though not many people express their opinions during public consultations, experience shows that the source of public complaints is sometimes project implementation. Should this kind of negative criticism arise in relation to this project in the future, having the results of the HIA would be very useful in addressing it (Box 6).

This HIA could have made a small but important contribution to closing the health gap resulting from social and health inequities.

Box 6. Endorsement of the public health authority

In most cases, HIA results do not lead to changes in a project proposal. However, the fact that the potential health impacts assessed by a project developer are examined (and approved) by the public health authority helps to overcome people's reluctance to certain projects, such as those related to building crematoria.

A favourable HIA report basically means the endorsement of a project by the public health authority, which in effect can improve public perception.

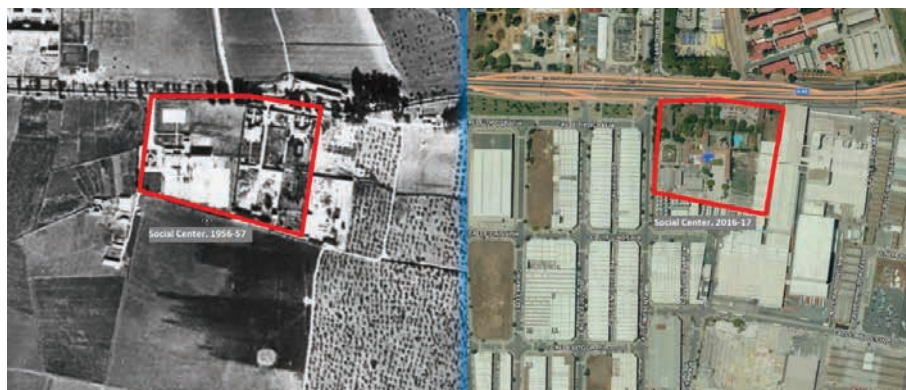
5.3 CASE STUDY 3. HIA OF URBAN PLANNING: AMENDMENT OF A LAND-USE PLAN

This case deals with the possible relocation of a social centre from a site adjacent to an industrial facility looking to expand its premises.

5.3.1 Stage 1. Project description.

A social centre built in the 1950s had become surrounded by industries. A motorway built in 1992 isolated it even more from the residential areas by preventing pedestrian access to the centre (Fig. 27).

Fig. 27. Aerial views of social centre, 1956–1957 and 2016–2017



Source: adapted by permission of the National Centre of Geographical Information, Ministry of Public Works and Transport of Spain.

A collaboration protocol had been signed by the company, the City Council and the Regional Government, according to which the social centre would be relocated and the company would cover all costs involved.

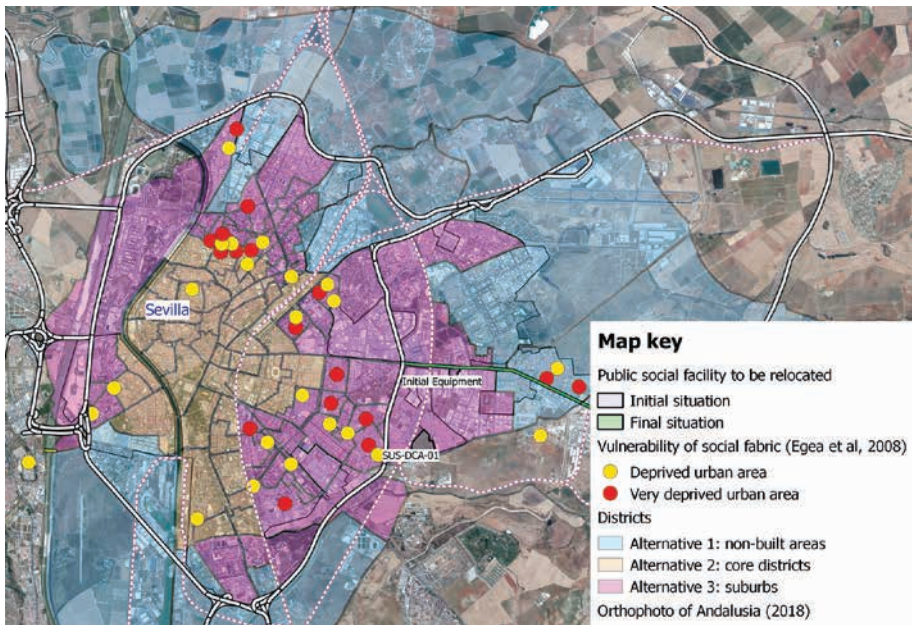
The City Council chose the new site. The HIA would consider four alternatives and highlight the best place for relocation of the centre, based on expert advice and the views of neighbourhood associations (Table 16, Fig. 28).

Table 16. Alternative sites considered for relocation of social centre

Alternative	Description	Comments
0	Original situation	Accessibility from the residential areas, as well as environmental shortcomings, were becoming an issue for the social centre. This would soon force the company to relocate the whole industrial facility, which would involve a high level of land consumption.
1	Site outside built-up areas	Although it would be easier and cheaper to build and new centre, this alternative would mean that it would likely be separated from residential areas either by a railway line or a motorway, restricting accessibility.
2	Site in a district inside the core of the city	As for alternative 1, except for accessibility, which would be optimal.

Alternative	Description	Comments
3	Site in a suburban district	As for alternative 1, except for accessibility, the level of which would be medium; however, suburban districts usually have fewer public social facilities.

Fig. 28. Possible alternatives for relocation of social centre



Source: author's own compilation based on IECA data and a study on vulnerability in Andalusia (37).

5.3.2 Stage 2. Population and environment description

This case involved the city of Seville, the largest city in Andalusia and the fourth largest in Spain. Seville has a total population of approximately 690 000 (2016) and a metropolitan population of about 1.5 million. Demographic information shows a slowly ageing population, though still young in the European context. Foreigners account for a 5.5% of the population of Seville, well below the national average; most come from Latin America or Morocco (34).

Seville hosts over 3 million tourists a year. Being a large commercial, administrative and business centre, industrial manufacturing also contributes to the economy. Employment opportunities are diverse, and the unemployment rate is below the regional average, attracting young people from nearby provinces.

As a rule, public facilities are well represented and health standards are high (for example, life expectancy at birth is around 79 years and 84 years for males and females, respectively); however, there are significant inequalities among the districts. As the project involved choosing one of them, the HIA focused on deprived areas.

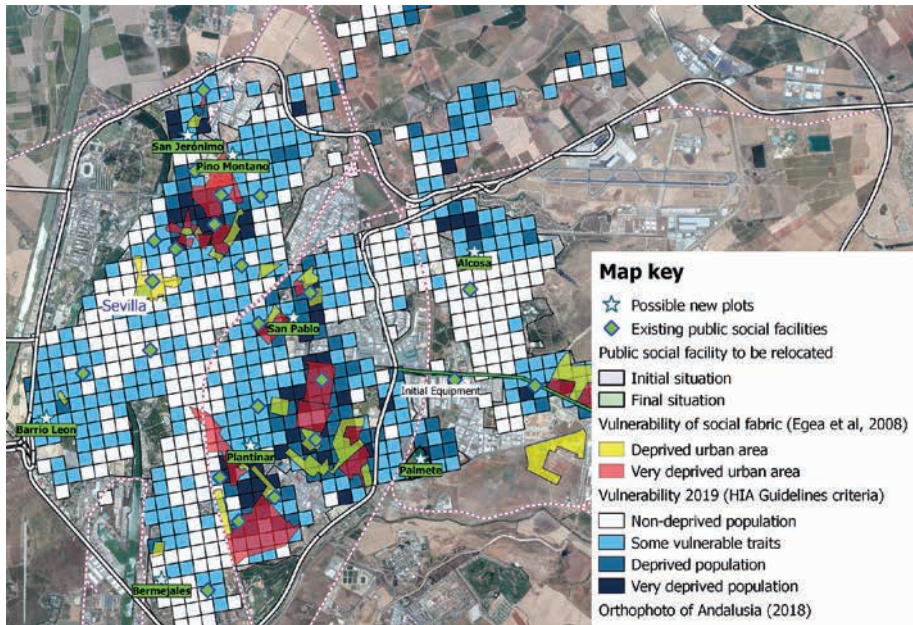
Common traits found among the people living in the deprived areas of Seville related to:

- demographics – they were on the whole younger than the average for Andalusia, and natality and mortality rates were higher among them;
- nationality – the proportion of migrants among them was low and markedly younger than the Spanish inhabitants in these areas;
- education levels – these were medium/low (20% of the inhabitants, especially older people, had never attended primary school);
- socioeconomic factors –poverty and youth-unemployment levels were high and income levels very low (Fig. 29).



Pictures provide by Turismo Andaluz

Fig. 29: Analysis of deprived population



Source: author's own compilation based on IECA data and a study on vulnerability in Andalusia (37).

Finally, comparing the original and final locations of the social centre, the most interesting differences between them were the following.

- *Original location*

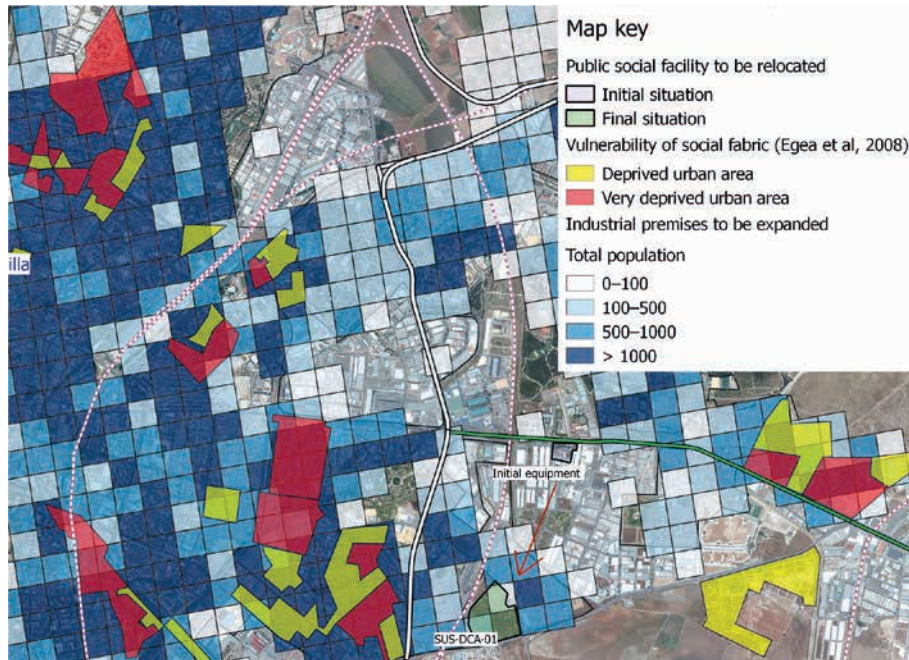
Once the centre was moved, no population was living near the initial location, which resulted in its being surrounded only by industrial sites and a huge road network.

- *Final location*

Palmete is a very deprived area on the outskirts of Seville with around 5000 inhabitants. It started as an illegal subdivision of land in the 1960's, consisting exclusively of self-constructed family homes. The situation has improved recently, but the inhabitants of Palmete have been demanding public facilities for a long time.

Fig. 30 shows the population distribution at the original and final locations.

Fig. 30: Population distribution at the original and final locations of the social centre



Source: author's own compilation based on IECA data and a study on vulnerability in Andalusia (37).

5.3.3 Stage 3: Impacts on determinants of health

While the HIA focused on analysing the potential impacts associated with the different site proposals for the relocation of the social centre, those triggered by the expansion of the industrial facility located near its original location were also assessed. To this end, the checklist relative to urban planning included in the HIA Guidelines (19) was used.

A qualitative assessment entails rating the qualities of the potential impacts as high, medium or low, according to the criteria contained in the HIA Guidelines (19,20). The HIA team quickly identified some as being nonconductive to establishing criteria for appraising the alternative sites (for example, housing, accessibility to green areas, liveability in urban spaces, water consumption, protection of heritage sites) (Table 17).

Table 17. Checklist of impacts on health determinants and their relevance

Health determinants	Probability (high/ medium/low)	Intensity	Permanence	Globally significant?
Accessibility/mobility				
Traffic generated	High	Low	Medium	Yes
Access to public transport.	High	Medium	Medium	Yes
Active mobility	High	Medium	Medium	Yes
Access to social facilities	High	Medium	High	Yes
Local employment and economic development	High	Medium	Medium	Yes
Urban design				
Density and connectivity	Medium	Low	Medium	No
Land tenure of vulnerable zones	Medium	Low	High	No
Consumption of land	Medium	Medium	Medium	No
Diversity of use	High	High	Medium	Yes
Viability/ease of relocation				
Economic costs	High	Medium	High	Yes
Completion time	High	High	Medium	Yes
Landscape and heritage protection	Medium	Medium	High	No
Urban metabolism				
Air pollution	High	Low	High	Yes
Noise	High	Medium	Medium	Yes
Supply and sanitation	High	Low	Medium	No
Water consumption	Medium	Low	Medium	No

5.3.4 Stage 4. Preliminary analysis

The preliminary analysis involves a qualitative analysis of potential health impacts triggered by determinants classified as significant in previous stages. Using the HIA Guidelines related to urban planning (19), a weighted valuation of factors pertaining to both the project and the population was conducted. This allowed the team to identify impacts that were relevant to assessing the project and to draw up the criteria for evaluating the different alternatives (Table 18).

An analysis of these factors revealed features that, in addition to the selection criteria, would be especially useful in ascertaining their relevance (Box 7). As these features can be readily transformed into quantitative standards that are easy to measure and estimate, they were used to refine the site-selection process.

Table 18. Criteria for evaluating alternative relocation sites for social centre

Criterion no.	Description
1	Economic benefits for the population: job creation
2	Meeting social needs: access to public social facilities
3	Economic efficiency: lowest additional costs
4	Management: shortest execution time
5	Mobility: contribution to a compact and diverse city.
6	Environment: lowest level of risk exposure (air pollution, noise)

Box 7. Additional site-selection standards (quantitative)

In addition to the evaluation criteria (Table 17), the following standards were used in choosing the district that could maximize the health gains with the highest ratings:

- availability of sufficient public land
- maximum accessibility, especially by public transport or via active mobility
- total population living less than 500 m from the site
- vulnerable population living close to the plot
- lack of public or social facilities (with regards to fighting inequalities)
- proximity of district to the initial site
- specific citizen demands (public engagement).

5.3.5 Stage 5. Relevance of impacts

This stage involves a semiquantitative analysis of the health impacts, based on the criteria selected in stage 4. In this case, for each criterion, a value was estimated and transformed into numbers ranging from 0 to 3, “0” meaning that the alternative would have a negative or no impact on health and well-

being, and “3” that it would have an optimal impact on health and well-being. The results are shown in Table 19.

Table 19. Valuation of alternative sites using health-related criteria.

Criterion no.	Numbers of alternative sites			
	Project			
	No. 1	No. 2	No. 3	No. 4
1	0	1	3	3
2	0	0	2	3
3	0	1	2	3
4	3	1	3	2
5	3	1	3	3
6	3	2	2	2
Total	9	6	15	16

The HIA team concluded that, in terms of health, the best alternative would be to relocate the social centre to a district on the outskirts of the city. Doing so would achieve optimal results in terms of employment, accessibility to social facilities, a decrease in mobility needs, an increase in social relationships, cost optimization and land consumption. Some negative environmental impacts could easily be minimized through additional measures in the construction phase.

5.3.6 Stage 6. In-depth analysis

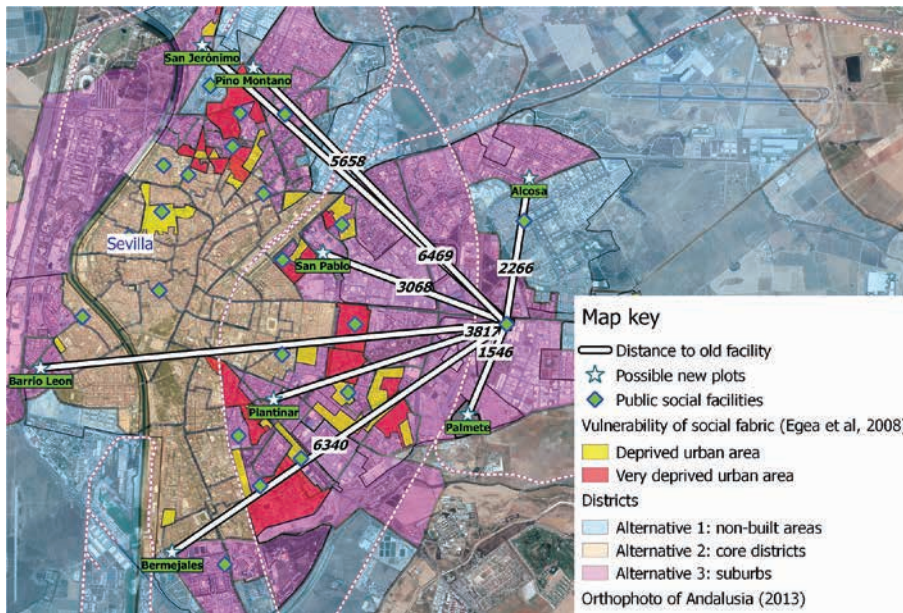
Once the type of district was selected, the next step involved choosing the best possible site. To do this, the HIA team calculated the following indicators (defined in stage 4) for each public site in the districts large enough to accommodate the social centre:

- number of people living less than 1000 m from the site;
- size of deprived population living less than 500 m from the site;
- distances from the site to the nearest social centre and the previous location;

- estimated time to get from the site to the nearest social centre (by public transport, on foot or by bike);
- number of requests to build a public facility in the district received during the latest participatory budget period;
- number of requests to build a public facility in the district received during public consultations on the project.

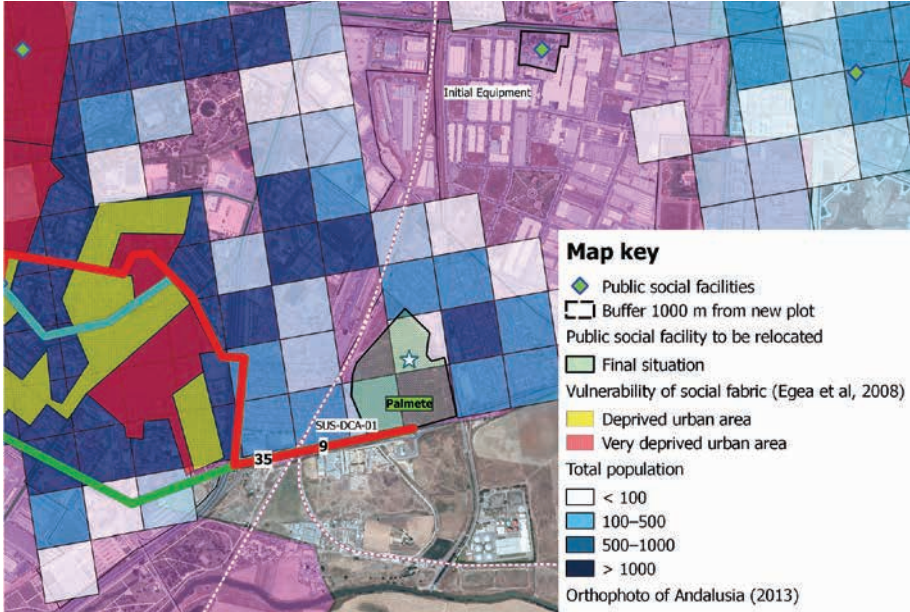
Taking all these indicators into consideration, the district chosen was Palmete. All of the indicators can easily be estimated using GISs, such as QGIS. Some of the calculations are shown in Figs 31–33. Table 20 shows the health-related criteria used in the valuation of alternative sites.

Fig. 31. Distance from new location to old facility



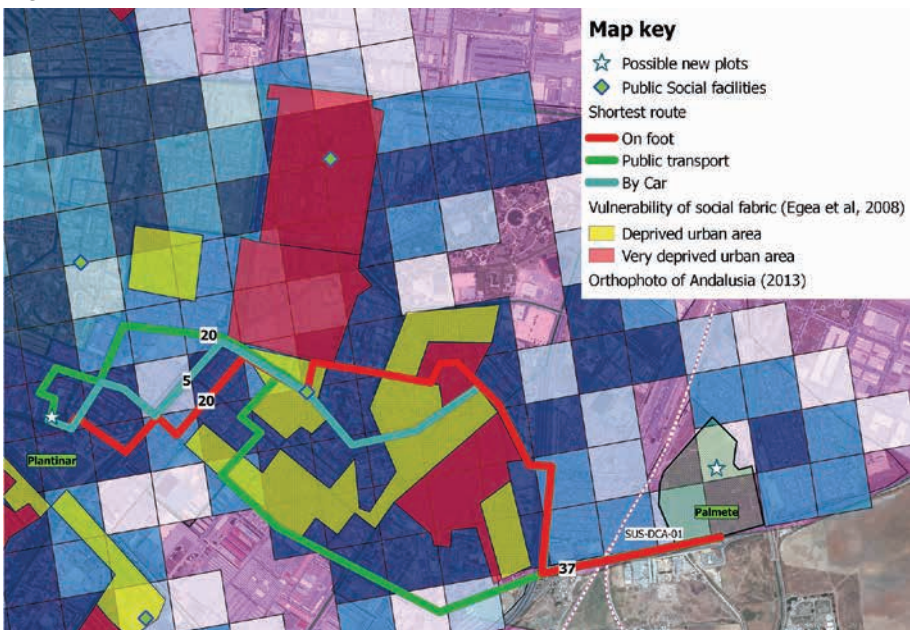
Source: author's own compilation based on IECA data and a study on vulnerability in Andalusia (37).

Fig. 32. Total population living within 1000 metres from new location



Source: author's own compilation based on IECA data and a study on vulnerability in Andalusia (37).

Fig. 33. Shortest route from selected site to nearest public social centre



Source: author's own compilation based on IECA data and a study on vulnerability in Andalusia (37).

Table 20. Valuation of alternatives sites, using health-related criteria

Possible new site	Total population < 1000 m	Deprived population < 500 m	Shortest route on foot ^a (minutes)	Shortest route by car ^a (minutes)	Shortest route: public transport ^a (minutes)
Alcosa	45 755	5 326	22	6	27
Bermejales	17 716	2 140	14	5	12
Barrio León	44 925	4 553	32	8	18
Palmete	29 333	17 413	35	9	37
Pino Montano	50 904	16 651	19	4	24
Plantinar	49 943	8 756	20	5	20
San Jerónimo	12 068	10 184	12	3	6
San Pablo	36 676	21 011	10	3	8

Note. ^aBetween possible relocation site and existing social centres in the area.

5.3.7 Stage 7. Conclusions

The overall potential output was considered highly favourable: expanding the industrial premises by relocating the social centre would yield positive outcomes in terms of rent and employment without seizing more natural land; human exposure to pollution would be reduced by relocating the social facility; the services at the new site would be the same, but with better access for a larger number of people; and the relocation would serve to fight inequalities and address long-standing public claims. Much of this success was attributed to the HIA.

It was proven possible and profitable to include health and well-being as a key component of policy development: the HIA provided recommendations on how to adapt the project to promote health gains and reduce health inequalities and, thus, helped to identify the best alternative site.

The HIA also allowed for greater transparency and accountability in public policies. Combining expected positive health outcomes with public consultations resulted in the undisputed choice of an optimal new location for the social centre.

While it obviously takes time to carry out a HIA, this case proved that the urban-planning administrative processes involved do not necessarily result in the need to extend deadlines.

The attitude of the City Council of Seville towards HIA changed radically from reluctance to using it and criticism of the tool as a “superfluous bureaucratic requirement” to considering it a constructive development to be widely used in decision-making processes.

The opinion of the citizens regarding HIA also showed signs of change: from initial scepticism to gratitude once they recognized that their views were being taken seriously.



Pictures provide by Turismo Andaluz

6. Examples from other members of RHN

6.1 FLANDERS (BELGIUM): ENVIRONMENTAL HEALTH IMPACT ASSESSMENT

Preventive health care, environment, education and spatial planning are regional matters in Belgium. The cluster of social and legal competencies involved offers the Flemish Region a unique possibility of dealing with them, using the HiAP approach (9).

In Flanders, a decree was passed in 2003 regulating preventive health care (45). The aim was to improve public health, particularly at the population level, and increase quality of life by strengthening health policy. Referring to the principles of HiAP (9), the decree states that the Government is responsible for taking initiatives to promote and protect the health of the population and prevent disease caused by physical, chemical and biological factors (indoor and outdoor environment). It also defines health-based guidance values for pollutants in water, air and soil, and recommends the implementation of a human biomonitoring network, the latter to be partly financed by the pollute-pays principle. The health sector supports initiatives in the non-health policy domains and focuses on vulnerable populations, using the precautionary principle and HiAP (9).

The implementation of environmental health impact assessment (EHIA) is not legislated in Flanders. There are two pathways to assessing environmental impact on health in the region; these are outlined in the above-mentioned decree on preventive health (2003) (45) and the decree on environmental policy (1995) (46). The National Environmental Health Action Plan is seen as a national exchange-and-collaboration platform on these regional matters (e.g., it defines the national focal point) (47).

The environmental legislation (spatial planning and environment) in Flanders is based on relevant EU directives, such as Directive 2010/75/EU on industrial emissions, and is the responsibility of the Department of Environment. It comprises environmental monitoring (soil, water, air), enforcement, standardization, permits, and implementation of best available techniques. One of the goals of the environmental legislation is to protect the environment and humans from the unacceptable risks caused by industry in

exploiting the environment. The Department of Welfare, Public Health and Family takes a HiAP (9) approach to supporting the legislation, for example, by: defining public health guidance values on environmental pollutants; interpreting environmental-monitoring and geospatial-modelled data for use in public health; and conducting and supporting public health assessment of the location of new roads, the expansion of residential or industrial areas and the implementation of new industrial processes. It also supports the accreditation of, and provides training for, environmental-health assessors, using a legally recognized guidance document on EHIA. By combining health and environment policies, Flanders is determined to close the gap to good health and shape the future of the environment towards a healthier situation.

The above creates a unique legislative and collaborative framework for EHIA implementation by giving the decision-maker (the regional minister and the local mayor) an insight into the health outcomes during the decision-making process, as well as by giving citizens an insight into ways of making healthy choices in their daily lives.

The following examples could inspire the use of EHIA.

(i) *Participation*

Participation is important. Based on the WHO framework explained in Meek et al. (2011) (48), Flanders developed a procedure for environmental health risk analysis (EHRA), which aimed at assessing human-health risks from exposure to environmental pollutants in a structured manner. The conclusion of the EHRA procedure is that it can be used in decision-making processes to determine action to be taken to protect public health and/or to respond to public concern, based on the level of risk acceptance in society. The procedure has been used successfully at several industrial sites surrounded by residential areas. One of the key elements of this success was the involvement of the local authorities, industrial partners and general practitioners in the area in various tasks and responsibilities within the projects. The techniques used were: environmental modelling; surveys, using health-related questionnaires; environmental sampling; and human biomonitoring (HBM). Regarding the last-mentioned, one of the standard questions raised is whether the HBM design has a bearing on the impact of the policy action, either positive or negative. HIA implementation is seldom a straightforward process.

(ii) *Urban development*

Healthy Cities is truly an important policy domain, which requires an integrated approach. In the Flemish Strategic Policy Plan for Urban Development, health is defined as one of ten core qualities to be considered in relation to urban development (e.g., during city planning). In integrating health themes (for example, equity, in- and outdoor air, traffic, mental health, access to green spaces, noise, education, personal-activity level, smoking, and access to healthy food), using EHIA, the idea is to approach urban areas as if they were contaminated sites, adapting trusted techniques as appropriate.

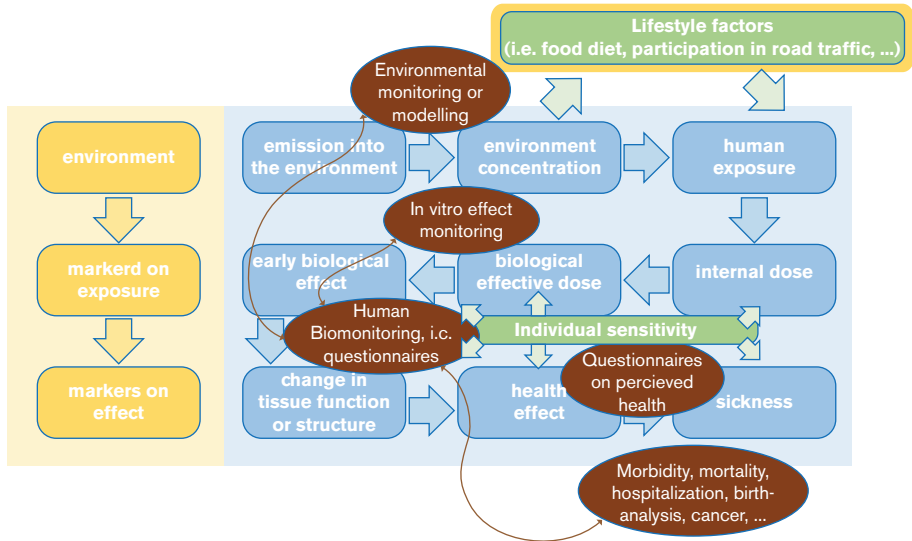
Some other successful projects relate to GIS-based visualization of walkability in neighborhoods – a toolbox, allowing the public planner or local government to experiment in the areas of city planning and heat-vulnerability mapping (to be launched shortly). The tool also performs quantitative cost–benefit analyses of modal shifts (to stimulate personal active movement).

In Flanders, the capacity to perform EHIA is brought together in a 3-tiered regional environment and health network. The highest level comprises a scientific support group of representatives of research institutes that compile scientific evidence on health and environment, analyse health data, conduct HBM and translate science into policy. The Government uses open calls with these institutes in closing management agreements; this means creating transparent (a legal requirement) partnerships within the scientific area in question. Level 2 includes representatives of the Department for Environment and the Department for Welfare, Public Health and Family, which collaborate from different viewpoints. Level 3 includes 13 locally stationed environmental-health officers who act as information portals, based on their field experience at the regional level. They also exchange information and provide local support on environmental-health issues to city and municipal authorities and general practitioners, as well as in connection with organized citizen initiatives.

The key to health assessment is to use the science available, not to create more need for science, and thus provide a policy game-changer at the regional and, more importantly, the local level. To achieve success in EHIA – whether problem- policy- or situation-specific – necessitates choosing the domain in

which capacity-building would have maximal impact. This choice can be directed by the classic exposure–effect relationship (Fig. 34).

Fig. 34. Causal diagram HIA focus: barrier-free housing and prevention of falls



Source: Den Hond E, Project Coordinator, Provincial Institute for Hygiene, Antwerp, Belgium, personal communication, 2011.

Much hands-on know-how is available in the different EU regions: the challenge is to explore it to find inspiring examples that can be used in other regional situations. Currently, the Department for Welfare, Public Health and Family is working on four projects aimed at defining future challenges in HIA. Looking at environment through a health lens, these challenges can be summarized as follows:

- making a geospatial connection between cause-specific mortality data and chronic-exposure environmental data (heat, pesticide and land use, air quality) at the municipal level;
- making a geospatial connection between health data (information about laboratory results, medication prescriptions, patient diagnoses electronically filed by general practitioners) and modelled environmental data at the neighborhood or municipal levels;

- calculating the estimated health effects of chronic exposure to air pollutants, using a peer-reviewed dose–effect relationship that translates these effects into health costs (in €) at the neighbourhood level;
- translating environmental data on acute exposure into possible health impact, using person-specific activity trackers and sublocal or person-specific environmental sampling boxes.

The goal of the last point is to evaluate the usability of generated insights in local policy and enhance people’s consciousness about making healthier choices. In connection with the latter, the project is aiming to work with high-school students in setting up their own personal app for use in combination with a do-it-yourself sampling kit.

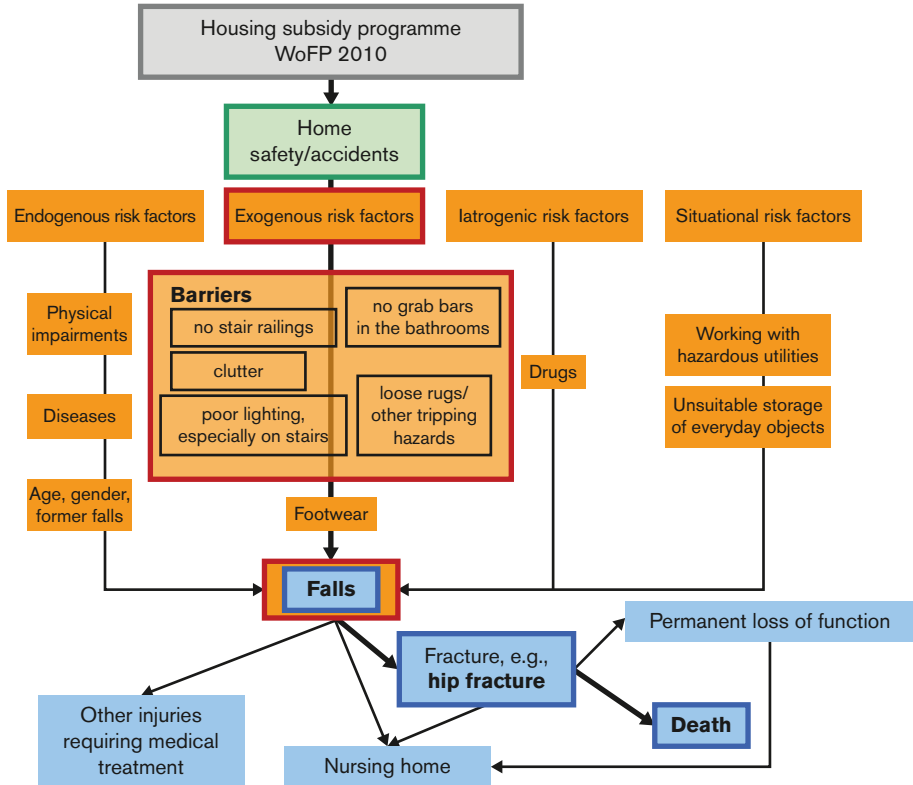
6.2 NORTH RHINE-WESTPHALIA. HIA INFORMS POLICY ON HOUSING FOR OLDER PEOPLE

The North Rhine-Westphalia (NRW) Centre for Health has been working in the area of HIA since the early 1990s. The NRW Public Health Services Act, which entered into force in 1995, stipulates that an HIA process may be carried out on a voluntary basis. The NRW Centre for Health carries out HIA-related work out by means of research projects. The project described in this chapter was conducted as part of the EU-funded RAPID project with the aim of developing a methodology to conduct a quantitative assessment of the potential health impacts of a proposed NRW policy. The NRW Housing Subsidy Programme (WoFP 2010 (49)) was selected for the HIA out of several potential policies.

Firstly, a comprehensive content analysis of the Programme was carried out. One of the issues it addressed concerned age-appropriate housing construction, particularly barrier-free construction. Based on an extensive literature review to identify relevant determinants of health related to housing, a causal web was developed depicting the cause–effect relationships between the selected policy, associated health determinants, risk factors and health outcomes. Subsequently, a causal web was developed for barrier-free housing. Based on discussions in the multidisciplinary HIA team, and in connection with the aim of developing a methodology for quantifying potential health impacts, the focus fell on falls, and a detailed causal web for this pathway was

constructed (Fig. 35). The relevant factors of the causal chains were separated into health determinants, exposure or risk factors and health outcomes.

Fig. 35. Causal diagram of focus of the HIA: barrier-free housing and prevention of falls



Note. Health determinants (green); exposure or risk factors (orange); health outcomes (blue).

A quantification of the health impacts of decreasing barriers in homes to reduce the number of falls in older people, as well as the numbers of fall-related fractures and deaths in this age group, was carried out. A detailed description of the modelling assumptions and quantification are reported by *Ádám B et al (50)*.

The findings showed that approximately 3000–8000 hip fractures and 600–1600 resulting deaths may occur each year in NRW due to construction-related barriers in the homes of older people. These estimates indicate that improving housing conditions could result in safeguarding the health of a

considerable number of older people. These negative health impacts could potentially be reduced by constructing barrier-free housing, or by modifying construction-related barriers in the existing housing stock. The focus of WoFP on the construction of barrier-free housing could actually prevent negative health impacts. While the Programme addresses only a small portion of the total housing stock (< 10%), it plays a leading role in NRW housing; in fact, others are now taking up the possibility of barrier-free housing construction.

The preliminary results of this HIA were discussed during a stakeholder workshop with participation from academia, the NRW Ministry for Housing and the housing-construction cooperative. Positive feedback was received from the Ministry, which was keen to have arguments that would further support the promotion of barrier-free housing. Monitoring the use of the HIA results was not in the scope of the HIA and remains unclear. Barrier-free housing is still part of the current housing subsidy programme (WoFP 2019) though not as prominently as in 2010.

NRW experience shows that the quantification of health impacts in HIA is feasible but that adequate models are needed. A series of international workshops, as well as a survey among model developers, were conducted between 2012 and 2016 (51,52). As a result, the NRW Centre for Health now works with a generic model for quantifying health impacts (DYNAMO-HIA). The model has been adapted to NRW conditions and is being applied to issues related to physical-activity policies (53,54).

HIA implementation, as a stand-alone approach, is still a challenging task in Germany and NRW. In assessing the health impacts of programmes, policies or projects in the environmental domain, this is conducted regularly in Germany within the legislative frameworks of EIA or SEA.

6.3 WALES. THE PUBLIC HEALTH IMPLICATIONS OF BREXIT: A HIA APPROACH

On 29 March 2019, the United Kingdom was due to leave the EU. The process, informally known as Brexit, had caused significant political and social upheaval since its start in 2016. With much uncertainty attached to the outcomes of the withdrawal and the transitional period, evidence of the future impact of Brexit on a wide range of policy areas was either extremely limited or highly contested.

The Wales Health Impact Assessment Support Unit, Public Health Wales (PHW), decided to carry out – in advance of the anticipated withdrawal date at the time – a HIA of the nature and extent of the potential impact of Brexit on the future health and well-being of the Welsh population. The purpose of the assessment was to enable PHW to plan for a post Brexit world and support other public bodies in their decision-making, planning and policy-making to this end.

In Wales, HIA is an evidence-based, systematic, flexible and participatory process, which supports organizations in assessing the potential consequences of their decisions, policies, plans or proposals on population health and well-being, as well as their effect on inequality.

A comprehensive mixed-method HIA was conducted over a 6-month period (July 2018 to January 2019), supported by a strategic advisory group and a working group. This included:

- a literature review, including grey literature and peer-reviewed journal articles;
- a review of qualitative evidence gathered through interviews with policy leads and a stakeholder workshop;
- health intelligence, including a community-health profile.

The HIA focused on environmental devolution in a distinctly Welsh context, as well as relevant political, social, cultural and economic factors. It also sought to identify significant potential positive and negative impacts on the wider determinants of health and specific population groups.

The potential impacts of Brexit were assessed through the following key pathways: trade agreements; the economy; changing relationships with EU agencies; uncertainty; and loss of regulatory alignment. An executive summary report, a report on the main findings (55) and two technical reports were produced. All evidence was published for public and professional scrutiny.

The findings of the assessment indicated that Brexit could have a significant direct impact on the wider determinants of health (including environmental, social and economic elements) and population groups, with a major indirect

impact on mental well-being. The policy context in Wales was identified as providing an enabling environment for maximizing any potential positive impacts in the future. Trade and trade agreements emerged as representing a key determinant of health, particularly in relation to existing environmental health regulations.

Potential direct positive environmental impacts identified included: enhanced environmental protection in relation to air-quality and bathing-water standards, for example, by strengthening regulations in the United Kingdom; enhanced food standards/safety/supply, for example, through the ability to create a more sustainable food-production system. Other possible positive impacts identified were: enhanced working conditions due to the devolution of powers; increased research and development due to the ability to build on current partnerships, for example with WHO; and the development of international partnerships.

Potential direct negative environmental impacts included: the reduction or erosion of environmental standards and regulations through future trade agreements; diminished air-quality standards through divergence from EU directives; lower water standards resulting, for example, from a reduction in the supply of key water-purification chemicals in the event of a “no deal” withdrawal; and negative impacts related to food standards/safety/supply, for example, border delays affecting the delivery and viability of goods. Other possible negative impacts included: loss of employment and skills resulting from employer relocation; decreased research and development due to reduced access to networks and funding; human-rights issues as Wales would not be covered by the European Court of Justice; and a lack of health and social care caused by an exacerbation of the existing staffing shortages and a reduction in the supply of medicines in the short term.

Some of the identified potential indirect impacts on mental well-being were: stress caused by continued uncertainty; impacts of reduced EU funding on communities; and the relocation of companies.

The majority of the potential negative impacts were highlighted as short to medium term in nature (characterized as 0–3 years and 3–10 years) and the majority of the potential positive impacts identified were highlighted as long-term opportunities for Wales (characterized as 10 years and over).

Many impacts could potentially affect the whole population. The population groups most likely to be significantly affected included: agricultural workers; children and young people; those at risk of unemployment; and those living in Welsh geographical areas receiving significant EU funding.

Recommendations included:

- utilizing the HIA as a joint organizational framework for coordinating, developing and tracking actions;
- knowledge and information exchange among public bodies with a view to planning for and responding to Brexit;
- conducting further research in areas with evidence gaps, for example, mental well-being;
- prioritizing policies and actions addressing the impacts of Brexit on vulnerable population groups;
- upskilling the public health system and increasing its knowledge about trade and trade agreements with a view to advocating health and well-being.

The HIA demonstrates added value by informing and influencing cross-sector planning and policy with respect to Brexit, and helping to ensure that population health and well-being, as well as inequalities, are considered at every juncture, particularly at a time when there is little robust evidence available. Local government and national organizations in Wales have already started to act to reflect the wider-determinants and population-health lens used in the assessment. The report (55) has been disseminated widely across Wales and internationally and, as a result, PHW has received many requests to share its experiences.

Many of the recommendations have been put into action since the report (55) was published. Work with several cross-sector stakeholders is ongoing: for example, a strategic workshop was held in August 2019 to identify future policies, strategies and plans to maximize long-term opportunities for Wales that may emerge from Brexit. In addition, the Wales Health Impact Assessment Support Unit is taking steps to mobilize knowledge on and understanding of

how to interpret and influence trade policies and agreements and use them to advocate health and well-being and reduce inequalities.

While this case study is not specifically focused on environmental health, it has many synergies with the overall conclusions of this publication.

The HIA was directed and led by an expert HIA team, ensuring the rigour and quality of the report. Developed through a strong cross-sector approach, the HIA has supported partnership working, providing a frame of reference for, and acting as a driver of, public health prevention and the use of a participatory approach.

HIA in Wales is currently voluntary but will become statutory as part of the implementation of the Public Health (Wales) Act 2017, which places a duty on public bodies in Wales to carry out HIAs in specific circumstances (yet to be defined). The HIA, which was carried out prior to publication of the statutory HIA regulations, demonstrates how Wales continues to lead the way in HIA and HiAP (9), strongly advocated by PHW.

The knowledge gained from this unique work is transferable to other countries, regions and health-policy leads – for example, its potential in informing the assessment of policies, plans and projects at all levels, particularly those relating to dynamic, evolving events of which the impact is uncertain. HIA can also influence cross-sector planning and policy by providing decision-makers and planners with strategic and practical recommendations of action that can be carried out despite an ever-changing political climate.

7. Conclusions and lessons learned

7.1 OVERALL CONCLUSIONS

In designing HIA implementation, it is important to understand that it can be a lengthy and often continuous exercise. As a tool, however, HIA brings with it the added value of incorporating health impacts into prospective evaluations of actions taken. It also offers a means of tackling new public health challenges, such as, those arising from the prevalence of chronic, noncommunicable diseases.

The use of this tool has proven to be beneficial to Andalusia where HIA now has a normative, legally binding status. This stands in sharp contrast to the previously held perception that it was primary threat. On the one hand, the standardized, health-specific report resulting from the HIA process has substantially increased the visibility of the health authorities and recognition of their efforts; on the other hand, it has brought with it an increase in the responsibilities (and pressures) of the parties concerned, as well as controversy.

The Flanders case study shows how having a legislative and collaborative EHIA framework – based on the principles of HiAP (9) and using the best available technique – can facilitate the work involved in determining potential environmental impacts. The importance of using HIA to influence policy implementation at the local level was illustrated in the case study from NRW, while that from Wales shows how taking an evidence-based, systematic and participatory approach to HIA can be used to tackle the impacts of an impending policy change in a holistic manner.

In Andalusia, HIA has also benefitted the work of the environmental sector. The relevant case study shows that it acknowledged that insufficient attention had been paid to the potential environmental impacts of the project on the population during the approval process. Not only did the assessment reveal potential positive impacts, but also inequalities in the distribution of these impacts among the population

It is clear from the different case studies in Andalusia and other settings that HIA contributes to the prevention of public-health problems. An example

of this is when it results in urban planners ruling out the construction of industrial premises and other highly polluting facilities (such as crematories) near inhabited areas. Preventive measures brought about in this way are far more effective than strict control policies, and much appreciated by the general public.

Another benefit is population empowerment. The HIAPR included in the assessment provides details about the objectives of the project in question, possible alternative measures and how they might affect the population, the reasons behind these measures, and action taken to ensure optimal impact. This document is made available to the public, enabling people to form an opinion about the project.

7.1.1 Key elements for success

According to experience in Andalusia, the key elements of success in the use of HIA are the following.

- *Strong political leadership during the HIA process*

Political leaders need to maintain a global vision. This involves having the highest possible number of partners with shared interests, and seeking win-win situations with other stakeholders. Leadership must understand that HIA is a long-term endeavour, calling for substantial negotiation, the ability to conclude agreements, and awareness of issues that are essential for the success of the project, as well as those that may be subject to debate.

- *Technical competency and the ability to provide guidelines on and criteria for conducting HIA*

Andalusia has benefitted from the development of a rigorous HIA procedure, which is universal, flexible and intuitive. It has been validated through practical implementation and the publication of HIA results in scientific journals. Combined with the availability of geographically indexed data supplied by an external agency (IECA), the assessment lends support to decision-making in the course of the procedure.

- *Availability of financial, human and capacity-building resources*

It is essential to establish a clear definition of the scope of HIA and align it with available resources. Failure to do so can compromise results, thereby preventing the timely delivery of appropriate responses to incoming requests for assessment.

- *Continued coordination with administrations in charge of environmental and urban planning*

The HIA process relies on collaborative work and the sharing of area-specific expertise among traditionally separate fields. It is an interdependent process that also relies on input from several non-health sectors.

- *Legislative endorsement of the HIA process*

Formalization or endorsement of the process can help remove bias (and ensure that projects assessed are not only those with potentially positive outcomes). This also enables the health authorities to require palpable changes in the activities in question. Since proper public health care usually involves sustained effort, a legislative framework would facilitate the long-term viability of an assessment and stave off political interference in the case of a change in government.

Other mechanisms, which can facilitate the introduction of the HIA are:

- incorporation of support mechanisms for promoters, such as pre-consultations, which facilitate determination of the depth of assessment required;
- integration of HIA into developers' administrative procedures to smooth documentation management and avoid unnecessary delays in approving developers' applications;
- public-awareness activities supervised by the health authorities to advocate the advantages of HIA;
- establishment of multidisciplinary groups tasked with assessing the project, given the different expertise required and the added value to be derived from the different sectors;

- development of network-based work strategy aimed at streamlining information exchange and leveraging previous experience.

7.2 LESSONS LEARNED

The experiences in HIA implementation included in this publication can serve as the basis for introducing certain modifications to the process.

- Screening should always take precedence over a fixed scope, due to the complexity of finding objective criteria for the delimitation of activities with a relevant impact on health and obtaining adequate resources. Fixed scopes are often connected with a questionable cost–efficiency ratio. The best screening venues are consultations held to set the scope of environmental assessment.
- HIA is too novel an activity to be implemented without a dedicated infrastructure within the public health-care system for HiAP-related activities, and – above all – without assessing the public policies that could serve as role models in the event of HIA of policies.
- Authorities must devote substantial time to advocacy and dissemination activities. In general, public health-care systems lack an internal culture of marketing their own activities and working in tandem with other administrations, which contradicts the goal of introducing a HiAP approach (9).
- Advocacy and dissemination should be coordinated by a top-level group, which would report to the department responsible for the coordination of political action at regional level. The group would be tasked both with the supervision of assessments in progress and the introduction of prospective assessments to the legislative process.

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Pictures provide by Turismo Andaluz

Annex 1. HIA model in Andalusia

Degree and mechanisms of institutionalization	Political setting and context	Framework and type of HIA	Implementation and resource requirements	Outcomes and conclusions
<p>Included in APHA (16/2011). Article 56 provides general indications regarding scope, procedure and responsibilities.</p> <p>Mandatory since publication of HIA Decree (2016), establishing:</p> <ul style="list-style-type: none"> • urban-planning projects subject to HIA; • private and public projects subject to HIA (only mandatory if project distance to residential area less than 1000 m); • preliminary screening for policies (by checklist) to determine necessity of full HIA; • HIA and pre-consultation procedures; • general contents of health impact appraisals. 	<p>Drivers of HIA linked to political commitment of Regional Ministry of Health.</p> <p>Before becoming mandatory, HIA was included in the III Andalusian Health Plan (2003–2008) to increase awareness of importance of tackling SDH and achieving healthy public policies based on HiAP.</p> <p>In 2010, Deputy Minister of Public Health appointed dedicated team to ensure consideration of HIA in APHA.</p>	<p>All HIAs conducted by developers. These are required to submit HIAPRs, which are assessed by HIA teams (coordinated by public health units). HIAs are binding and resulting recommendations must be incorporated in projects seeking approval (does not apply to policies).</p> <p>Although conducted as stand-alone procedures, HIAs follow same administrative procedures as those for EIAs to avoid overlapping requirements for project developers.</p>	<p>Development of specific guidelines and tools (two methodological handbooks and six supporting documents launched before entry into force of HIA Decree (2016)).</p> <p>Dissemination activities.</p> <p>Three Instructions on HIA procedure issued aimed at coordinating effects-related reports of Regional Ministry of Environment and Regional Ministry of Health in environmental assessments.</p> <p>Internal organization:</p> <ul style="list-style-type: none"> • identification of ideal professional profiles for and specific training needs of human resources involved in HIA; • development of HIA teams (Andalusian HIA Network) and specific software. 	<p>HIA is an overall success. The incorporation of health into prospective assessment of impacts, constitutes the main tool for tackling new public health challenges arising from prevalence of chronic, noncommunicable diseases.</p>

Source: Based on Lee JH, Röbbel N, Dora C. Cross-country analysis of the institutionalization of health impact assessment. 2013 (Annex B. Summary of country findings by dimensions of the analytical framework); https://apps.who.int/iris/bitstream/handle/10665/83299/9789241505437_eng.pdf;jsessionid=0D07A595FB567CF0991C006295AF066?sequence=1, accessed 18 October 2019).

Annex 2. Summary of preliminary analysis of health impacts

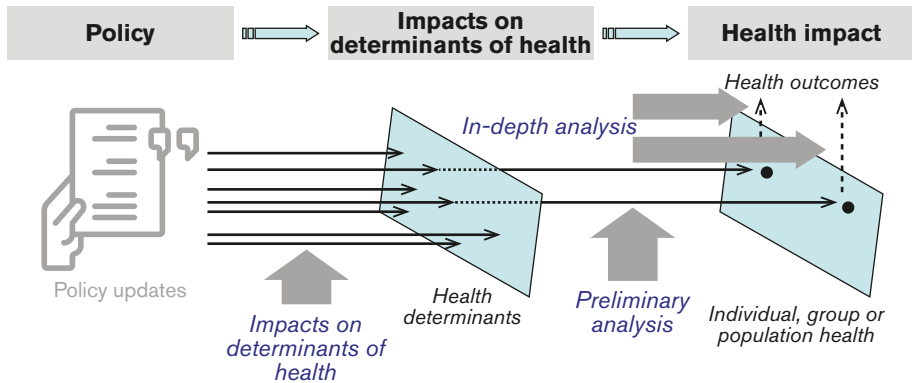
The HIA methodology in Andalusia consists of 3 phases and 7 stages.

1. Description phase
 - Stage 1: description of activity
 - Stage 2: description of affected population and environment.
2. Assessment phase
 - Stage 3: identification of potential effects on determinants of health
 - Stage 4: preliminary analysis (decision on depth of the analysis)
 - Stage 5: relevance of impacts
 - Stage 6: in-depth analysis.
3. Concluding phase
 - Stage 7: presentation of the conclusions of the assessment.

The purpose of the preliminary analysis (stage 4 of the HIA methodology in Andalusia) is to define the depth of analysis required to assess the potential health impacts of a policy (Fig. A2.1, Box A2.1). The preliminary analysis should be of a qualitative nature and based on the information obtained in stage 3 (identification of potential effects on determinants of health).

If this qualitative analysis does not rule out the likelihood of significant health impacts, a semiquantitative analysis should be conducted, using ad hoc indicators to allow for an objective decision on the need to carry out a more in-depth analysis.

Fig. A2.1. Preliminary analysis



Box A2.1. Considerations of a preliminary analysis

A preliminary analysis should respond, at minimum, to the following questions.

- What are the potential impacts of the project on SHD that would affect health most?
- What direct and indirect health consequences can be expected?
- What segment of the population would likely be affected by these consequences?
- In this population, are there any vulnerable groups or groups disproportionately affected by these consequences?
- What is the population's perception of these consequences?

If the population is likely to be affected:

- is it possible to ascertain any doubt that the potential impacts (either positive or negative) are relevant to population health, or unevenly distributed among the population in question?

Stage 4 is the first in which the specifics of HIA are investigated. The methodology proposed for the preliminary analysis consists of three steps: (1) identification of the first identifies the potential effects of impacts on SDHs on the well-being of the population through a scientific search on this relationship; (2) identification of the affected population; and (3) identification of the exposure pathways (Box A2.2).

Box A2.2. Exposure pathway

In environmental toxicology, the term, “exposure pathway” refers to the process followed by a chemical agent from the source of emission (= source) to the person or population exposed to the agent (= receiver) – in general, to all processes that can cause an impact on health (or make it more likely) (1).

Step 1 of the preliminary analysis: identification of potential effects

The best way to identify potential effects would be to review the scientific evidence to identify correlations between the determinants and effects on health. There are also numerous published guidelines and reports that can be of help in assessing the intrinsic capacity of these determinants in influencing population health, as well as potential international support associated with this information.

To help visualize the concept of potential effect, the following hypothetical project related to sources of air pollution can be used as an example.

- *Example*

The preliminary analysis (stage 4) showed that poor air quality was having significant effects on the health of the population (= potential effect) even though no investigation had been made into whether potential effects would actually occur (= effect on health). Had stage 3 been followed, however, air quality would have been identified as having had an impact on SDH, and the next step would have been to investigate the potential effects.

Therefore, step 1 of the preliminary analysis would simply have been to:

- select the potential impacts of the poor air quality on the determinants identified in stage 3;
- roughly estimate the level of change on the environment expected as a result of these impacts;
- check for possible health impacts associated with this change, by searching through scientific evidence or published guidelines;

- identify possible ways of enhancing the health of the population affected by the change in SHD, checking at the same time whether these had already been implemented in the project, as this would likely modify the final impact of the project on health.

Step 2 of the preliminary analysis: identification of affected population

The second step is to identify and describe the population (real or potential) whose health may be affected by the potential health effects of the specific project. Here, special attention should be paid to population groups that may be more vulnerable to each impact, particularly due to their physiology, previous health status, distance to the area where impacts are produced, socio-economic conditions and any other relevant factors.

Thus, in the second step, the following questions should be asked.

- Will the project affect some vulnerable populations more than others?
- Is the population in the vicinity of the project likely to profit from the creation of new jobs?
- Will the positive/negative impacts of the project affect all population groups to the same extent?
- Is the affected population expected to be worried about/interested in this project?

In this step of the preliminary analysis, the issues will always be population oriented (Box A2.3).

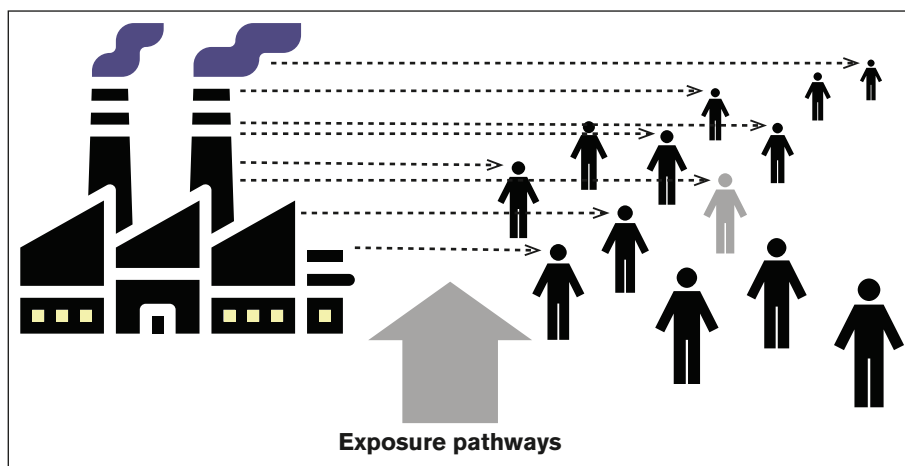
Box A2.3. Information on affected population

Most of the information related to total exposed population, vulnerable groups and inequities can be found in the data collected in phase 1 (stages 1 (description of activity) and 2 (description of affected population and environment), while the information necessary to assess the perceived risks can be obtained from the analysis of the results of participatory processes.

Step 3 of the preliminary analysis: evaluation of environmental impact – exposure pathways

Regarding chemical agents, impact is evaluated by analysing the possible exposure pathways (Fig. A2.2, Box A2.4). An exposure pathway can be considered complete when there is evidence to show that people are (or have been) in contact with the contaminant (or when the probability of such contact is high).

Fig. A2.2. Simplified graphic interpretation of exposure pathways



Box A2.4. Elements of an exposure pathway

1. *Pollution source*
This can be any source releasing pollutants to the environment (e.g., a landfill, an internal combustion vehicle).
2. *Transport and transformation media*
Once released, pollutants move through different environmental media, possibly reacting with other substances (even degrading and disappearing in this process).
3. *Exposure point(s)*
Place(s) where people come into contact with the pollutant.
4. *Exposure route*
A way in which a pollutant enters the body. The main exposure routes are inhalation, ingestion and through dermal contact.
5. *Potentially affected population.*

In the preliminary analysis, however, only a qualitative (preliminary) assessment of the exposure pathway is made to assess whether the pollutant is the result of some type of emission, spill or release of substances deriving from the project. However, analysing the exposure pathway is a key aspect in the following stages and should be carefully studied in an in-depth analysis if this is found necessary.

If it transpires that people could potentially be affected, the following should be evaluated:

- whether some groups could potentially be more affected than others;
- whether there could potentially be vulnerable groups within the affected population;
- whether the effects could be distributed more evenly as compared to the current situation.

Drawing conclusions from the preliminary analysis

Finally, an assessment should be made of whether the information obtained, including uncertainties detected, could rule out any significant potential impact(s) of the project on health or health inequality. A positive response would allow us to exclude this/these potential impact(s) from further analysis. Otherwise, the analysis should continue.

The guidelines on HIA implementation in Andalusia (2,3) provide a screening tool in the form of tables to assess the impacts (Tables A2.1 and A2.2) and to conclude their relevance (Table A2.3). The assessment takes two types of variables into account, those inherent to the relevance of impacts associated with the project and those related to population factors (Table A2.1). It provides qualitative evaluation criteria for these variables so that, finally, a table of health effects can be generated for the preliminary analysis and used to arrive at a conclusion (Table A2.2).

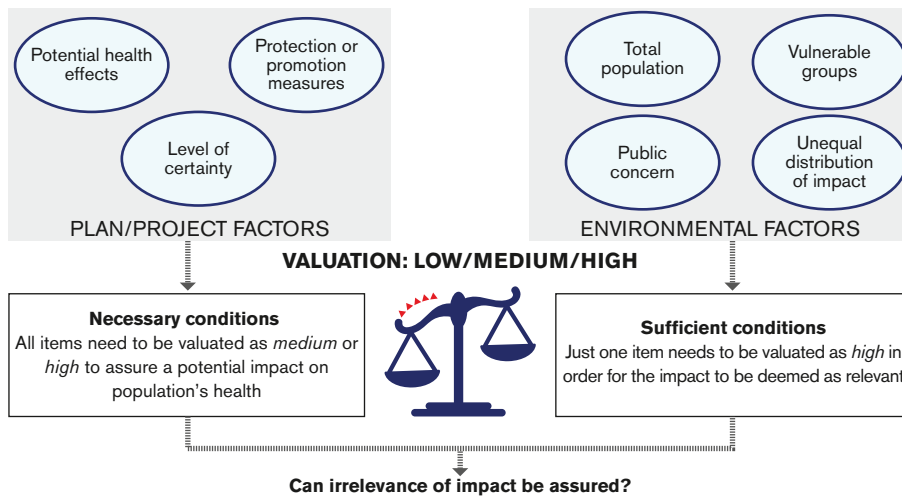
Thus, for the preliminary analysis, it is proposed to subdivide the variables into two groups: those associated with the project, plan, programme or policy, and those associated with the affected population.

To investigate the relevance of a potential impact, both groups of variables need to be assessed; however, the assessment is slightly different for each group. Project variables are considered “necessary conditions”, meaning that all items are needed to assure a potential effect on health. On the other hand, social variables are considered “sufficient conditions” so that only one of them is needed to make a potential impact (Fig. A2.3). According to this criterion, it is proposed that the significance of the impact be based on the assessment of each variable at its:

- lowest value with respect to project or policy variables
- highest value with respect to population variables.

Once all the necessary information is to hand, the overall conclusions of the assessment should be presented along with the initial data, the completed checklist (Table A2.2) and a short justification of the choices made.

Fig. A2.3. Methodology of preliminary analysis



Source: Guidelines on HIA implementation in Andalusia (2,3).

Instructions for completing the table in the checklist of the preliminary analysis

The main difference in the checklist for the preliminary analysis (stage 4) compared to the checklist used in stage 3 (identification of potential effects on the determinants of health) is that, in the former, the determinants are not predetermined. Therefore, the first step in completing the checklist for the preliminary analysis should be to enter the determinants deemed relevant in stage 3 in the preliminary evaluation table of the checklist (Table A2.1).

It should be remembered that the selection of the determinants is based on an assessment of both the results obtained in the analysis completed in stage 3 (probability, intensity and permanence) and their relative importance in terms of overall potential impact on the well-being of the population.

As the table for the checklist in the preliminary analysis will contain data of a qualitative nature, it must be accompanied by a brief report on the reasons for the selection of the values used to arrive at this information. In general, it has been established that, in the qualitative gradation of the intensity of the effect, using three levels (high, medium and low) is an acceptable solution (Table A2.2). On the one hand, it is a simple way to categorize and, on the other, it allows this to be done at a sufficient number of intensity levels.

The content of the table is based on a purely qualitative evaluation and this can result in personal variability or different points of view. Therefore, it is only possible to provide general guidance on how to complete the table, bearing in mind that each case will have its own specific peculiarities. Despite this, any assessment must be based on documented evidence or, at least, experience.

The variables to be assessed are:

- potential impact – maximum intensity of the potential impact on population health (taking nature and intensity of the impact into account);
- level of certainty – degree of confidence about the likelihood of the expected health impact at the population level (based on the reliability of pronouncements made by scientific national and international organizations on the issue and the support they provide);

- protection or promotion measures – the existence and effectiveness of measures to erase or mitigate negative health effects and/or promote positive health effects;
- total population – the size of the exposed population and/or affected population in absolute terms, although for this variable, it would be advisable to take its relative importance into account in the case of small municipalities;
- vulnerable groups – populations whose ability to resist or overcome an impact is significantly lower than the average, either because of intrinsic characteristics or in connection with social/demographic issues (age, sex, people with disabilities or at risk of social exclusion, immigrants or ethnic minorities);
- inequities in distribution – populations that are unfairly or disproportionately affected by the outcome of a project, or deprived populations whose status has worsened;
- public concern – aspects transpiring from community participation that arouse specific concern/interest among the population.

Tables A2.1, A2.2 and A2.3 facilitate the preliminary analysis (Box A2.5). The final result involves shortlisting the determinants rated “relevant” and, when applicable, continuing to analyze them in the following stage of HIA (stage 5: relevance of impacts).

Box A2.5. How to carry out the preliminary analysis

1. Complete the left-side column in Table A2.1 regarding the areas or determinants identified as significant in the stage 3.
2. Assign high, medium or low values in the preliminary valuation table (except for the greyed-out in the last column), according to the criteria from Table A2.2.
3. Calculate the result, using criteria from Table A2.3 (decisions resulting from preliminary analysis).
4. Select the determinants rated “relevant” for inclusion in the following stage of the analysis (stage 5: relevance of impacts).

Table A2.1. Checklist for preliminary analysis

Health determinants/ associated areas	Policy or project factors				Population factors					Is the global impact significant?
	Potential effect (*)	Certainly	Measures	DECISION	Total population	Vulnerable Groups	Inequity in distribution	Public concern	DECISION	
Environmental factors										
Socioeconomic factors /social coexistence										
Other factors										



Table A2.2. Preliminary valuation table

Variable	Low	Medium	High
Potential impact	Mild effects on quality of life of population.	Effects modifying the incidence or symptoms of non-serious diseases and non-debilitating injuries.	Effects that can significantly alter DALYs, the incidence of serious diseases (e.g., those requiring hospitalization, chronic, acute outbreaks) or debilitating injuries.
Level of certainty	Published articles and studies. Evidence obtained by own means.	Meta-analysis, systematic reviews, comparative analysis, etc. Aspects incorporated in legislation of other countries.	Recommendations of international organizations. Clear statements of international organizations of recognized prestige Aspects incorporated in national legislation/action plans.
Protection and/or promotion measures	Measures of recognized effectiveness implemented in the project.	Measures taken are either not totally effective or implemented using best available technologies.	No effective measures known or implemented in the project.
Total population	Exposure usually short or intermittent or affecting a very limited area/population, i.e., under 500 people.	Exposure for longer periods of time or affecting either localized areas/medium-sized populations, i.e., between 500 and 5000 people.	Exposure that is long-term or permanent or affecting large areas or populations, i.e., more than 5000 people or the whole population of a settlement.
Vulnerable groups	No vulnerable groups detected.	Presence of people with vulnerable traits either dispersed or concentrated in a small community.	Presence of people with many vulnerable traits concentrated in several small communities or a medium-/large-sized community.
Inequities in distribution	Regular or fair (or reduction in uneven) distribution of effects	Uneven distribution of effects (because of creation of new inequities or lack of decrease in uneven distribution)	Very unfair distribution of effects (increasing previous inequities)

Table A2.2 contd

Variable	Low	Medium	High
Public concern	Specific attention paid to public opinion and results showing no special public concern about the project.	Either not enough attention paid to public opinion or results showing some concern about the project.	Mandatory actions (public exposure) and complaints from public (also known from the press or demonstrations).

Table A2.3. Decisions resulting from preliminary analysis^a

Variables	Project/policy variables			Population variables			Global impact relevance
	Potential Impact	Level of certainty	Protection measures	Total population	Vulnerable groups	Inequities in distribution	Public concern
Criteria	NECESSARY			SUFFICIENT			
Condition	All factors need to be present to confer relevance to the expected health impacts			Just one factor is needed to confer relevance to the expected health impacts			
Verdict	Take the LOWEST value of the three variables			Take the HIGHEST value of the four variables			
Possible results (once made the verdict)	HIGH			HIGH			RELEVANT
	MEDIUM			HIGH			RELEVANT
	LOW			HIGH			RELEVANT
	HIGH			MEDIUM			RELEVANT
	MEDIUM			MEDIUM			NON-RELEVANT
	LOW			MEDIUM			NON-RELEVANT
	HIGH			LOW			NON-RELEVANT
	MEDIUM			LOW			NON-RELEVANT
	LOW			LOW			NON-RELEVANT

^a Note. The combination HIGH (project variables)–LOW (population variables) has been ruled as having no significant effects on health, since this possibility can only occur when no exposure pathways to population have been identified or are considered to be of little importance, and do not cause health inequities or citizen concern. Despite the importance of the impact on environmental and/or socioeconomic conditions, as there is no affected population, health results are not produced.

References³

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³ All URLs accessed 26 October 2019.

The WHO Regional Office for Europe

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The driving forces behind current health challenges often lie outside the direct control of the health sector; ensuring the inclusion of health and well-being as a key component of policy development in all sectors (the Health in All Policies (HiAP) approach) has been emphasized as the best way to approach these challenges. As a tool to this end, health impact assessment (HIA) can be used to determine the potential effects of a proposed policy, plan, programme or project related to population health and the distribution of these effects within the population. This publication describes experience gained in HIA implementation in Andalusia over the last five years and includes case studies from Andalusia and other European settings, illustrating a range of approaches taken in various regional, political and policy contexts. Focusing on the development of the tools and procedures involved, it presents general conclusions, including elements of success and conflict, misgivings, windows of opportunity and lessons learned.



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