



Assessing awareness and perceptions of health impact assessment (HIA) among students and young professionals in Spain: An online survey

Encarnación González-Algarra^a, Eduardo Moreno^a, Miguel Angel Casermeiro^{b,*}

^a Environmental Technology, ETSI, La Rábida - Facultad de Ciencias Experimentales, Huelva, Spain

^b Soil Science Unit, Pharmaceutical Chemistry Department, Pharmacy School, Universidad Complutense de Madrid, Pz Ramón y Cajal s/n, Madrid, Spain

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ABSTRACT

This study assesses the awareness and perception of Health Impact Assessment (HIA) among future practitioners in Spain, including health science and engineering students, and current public health and environmental professionals. Although HIA is recognised worldwide as an important public health tool, our results show that awareness of HIA varies considerably across these groups. Only 14 % (18 out of 129 respondents) reported being familiar with HIA methods. This gap highlights the need for improved educational programmes and the creation of a clear legal framework to support HIA implementation in Spain. In addition, the robust Spanish health system may mask the perceived need for HIA, creating a potential barrier to its wider adoption. By identifying these challenges, our study highlights key aspects for action, including legislative reforms and educational initiatives, to create a favourable environment for HIA practice. Our findings argue for a multidisciplinary approach to health assessment and highlight the need for future research to investigate effective strategies for integrating HIA into the Spanish health system.

1. Introduction

Health Impact Assessment (HIA) is a well-known tool that is promoted and used worldwide (WHO, 1999). Taking the broader perspective of the International Association for Impact Assessment (IAIA, 2024), health impact assessment (HIA) is “a combination of procedures, methods and tools by which a policy, program 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”. The practice, scope and societal perception of HIA has changed over time, but these procedures always comprise two main aspects: an assessment of the positive and negative impacts of the activity on the health of a specific population; and, additionally, to help in the decision making processes, a focus on any inequities within the population.

Originally, HIAs were designed to incorporate health considerations into Environmental Impact Assessment (EIA) procedures. In the early stages, the approach was to integrate HIA processes into more established environmental impact assessment (EIA) procedures and systems (Birley, 2003; Ahmad, 2004). An interesting review of the origins of HIA frameworks has been compiled by Mindell et al. (2008). This aspect was adopted by the European Directives on Environmental Impact

Assessment (EEC/337/85), transposed into Spanish national EIA regulations, and today, this concept is frequently referred to in new legislation, published in the *Boletín Oficial del Estado* (Official State Gazette, BOE, 2023). Health issues at the project level have emerged through the traditional concept of risk assessment, which includes exposure to pollutants and other agents, among the most important aspects to be considered (Franssen et al., 2002). At virtually the same time, Scott-Samuel et al. (2001) proposed a critical review of the most commonly used procedures, termed a “new approach” to HIA. In any case, HIA comprises multi-dimensional aspects such as: environmental health issues, communicable diseases, nutrition issues and mental wellbeing, among others. This shifted the practice of HIA towards the search for new methodological procedures, with the debate revolving around the integration of democracy, public participation, and equity into HIA (WHO, 2015). The inclusion of social aspects was undoubtedly the next step in the development of HIA practice. In the 1990s, Dahlgren and Whitehead’s model (Dahlgren and Whitehead, 1991) emphasised inequality in the analysis of the social determinants of health, influencing the development of HIA. Solar and Irwin (2010) developed the conceptual social determinants of health (SDH) framework, which has been adopted as standard in different cultural contexts, countries and

* Corresponding author.

E-mail addresses: algarra@uhu.es (E. González-Algarra), emoreno@uhu.es (E. Moreno), caserme@ucm.es (M.A. Casermeiro).

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levels, and especially at the local one.

The rapid development of HIA has produced a flood of manuals, guidelines, tools, web resources and case studies in different countries, languages and formats, which are invaluable for practitioners and academics and form the bedrock of HIA education. Most of these published materials can be easily found on the Internet. One example is the [WHO website \(2016\)](#).

The integration of HIA into national regulations has been a gradual process in different countries and decision-making processes. At the beginning of the EIA regulations, the EU included human health in the recitals of Directive 337/85.

Health Impact Assessment (HIA) is a widely accepted practice across Europe ([Hübel and Hedin, 2003](#)) and is used to assess the potential health impact of policies, programmes or projects. Countries such as the UK (including its constituent countries such as Wales), the Netherlands, Sweden, France, and Spain have integrated HIA into various areas such as urban planning, transport and environmental policy. The UK is a leader in the implementation of HIA and has a well-established framework and extensive experience of carrying out assessments in different sectors ([Chilaka, 2010](#)). In Wales, HIA is now a statutory requirement, underlining the country's pioneering role in the UK ([Green, 2022](#)). The Netherlands also has a solid tradition of HIA, with a focus on integrating health considerations into decision-making processes ([Broeder and Staatsen, 2012](#)). In Sweden, HIA is recognised as a valuable tool for promoting public health and is often used as a basis for policies and projects ([Knutsson and Linell, 2010](#)). France has also made significant progress in incorporating HIA into its governance structures, with initiatives aimed at assessing and addressing health impacts in different sectors ([Jabot et al., 2019](#)). In Spain, efforts are underway to promote the implementation of HIA nationwide, although this practice is still relatively new compared to other European countries. Nevertheless, the importance of HIA for decision-making and the promotion of health equity is increasingly recognised ([Cave et al., 2021](#)).

In North America, HIA is going strong. Of particular note is the case of Canada ([CEEA, 2012](#)), and especially Quebec where HIA has been in place since 2002, when the Public Health Act came into force ([Quebec Official Publisher, 2002](#); [Gagnon et al., 2008](#)). In the United States, there is no federal regulation, but many states are involved in the development of HIA, as noted by the [Pew Charitable Trust \(2015\)](#); at least 9 states have their own laws that have been introduced since 2007. Although HIA is not mandatory in the United States, extensive experience is being gained. The Environmental Protection Agency conducted a review of more than 80 case studies in 2013 ([Rhodus et al., 2013](#)), and experience is growing year by year. A comprehensive overview of the regulations in different countries was compiled by [Hebert et al. \(2012\)](#).

There is a long tradition of issues related to public health and projects being analysed, especially by local authorities in the second half of the 20th century who used special measures known as the Regulation of annoying, unhealthy, harmful and dangerous activities, or RAMINP for its Spanish initials ([Official Gazette, BOE, 1961](#)). While this approach is far from what we understand today by HIA, it was practical when it came to considering certain health issues in procedures to authorise a new activity. In Spain, after the declaration of the Constitution in 1978, there was recognition of the fundamental right of citizens to health and the obligation of the authorities to promote health (art. 43) ([Official Gazette, 1978](#)). The general health law ([Official Gazette, BOE, 1986](#)) led to the creation of the *Interterritorial Council* of the *Spanish National Health Service*, one of the main pillars in the decision making processes for the health authorities, through the National Health Database System. This included a specific sub-directorate general for Environmental Health, which is responsible, among other matters, for the assessment of HIA in policies, legislation, plans, programmes and projects, always in cooperation with the Ministry for Ecological Transition ([Official Gazette, BOE, 2021](#)). Although the concept of HIA has been regulated under Law 33/2011 on Public Health ([Gazette and BOE., 2011](#)), the practice of HIA in Spain is still far from being fully implemented. A

major problem with the legislation in Spain is that regional governments are responsible for creating their own public health laws and only one of the autonomous regions, Andalusia, has included HIA in its legislation ([BOJA, 2011](#)). Nevertheless, other regional governments have put HIA on their political agenda.

In Spain, the division of responsibilities at different levels is a major challenge. National, regional and local governments share responsibilities in the field of public health, and several departments operate in two different areas: environment and health. Inter-sectoral collaboration is also a major challenge in the effective implementation of HIA in Spain.

It is remarkable that in the last decade some new national inter-sectorial plans affecting the environment and health has been developed, but unfortunately without any HIA. These plans include the national plan of preventive actions against the effects of extreme temperatures on health (2004), the national climate change adaptation plan (2006), the national air quality plan (2017), and the national plan for the depuration, sanitation, efficiency and reuse of water (2016). A review of the efficiency of these plans can be found in the new Strategic Health and Environment Plan 2022–2026 ([Ministerio de Sanidad y Ministerio para la Transición Ecológica y reto demográfico, 2022](#)).

There is very little experience with HIA in Spain. One of the first case studies was the HIA of a Motorway in the Basque Country ([Esnaola et al., 2008](#)). [Morteruel et al. \(2020\)](#) recently posed an open question to the Public health community about the effectiveness of HIA in Spain. Some recent experience has been gained at the municipal level ([Palència et al., 2020](#)), but far less than in other countries. [Iglesias-Merchan and Domínguez-Ares \(2020\)](#) pointed out the challenges involved in the integration of inequality through HIAs into Spain today. In another work, the same authors examine the perception of the main categories of health determinants in Spain ([Domínguez-Ares et al., 2020](#)). Apart from some specific postgraduate programmes, HIA is not well known in Spanish academic forums, so young practitioners, including in this group environmental consultants and public health professionals, have neither theoretical knowledge nor specific training. Few HIA guidelines have been developed in Spain, the first being related to HIA and wellbeing in policies, programmes and projects in the Basque Country ([Rueda, 2005](#)). The Andalusian authorities developed a guideline for projects ([Rodríguez et al., 2015](#)) and urban planning ([Moya-Ruano et al., 2015](#)) and more recently a guideline on HIA when applied to the implementation of legislation ([Ministerio de Sanidad, 2023](#)).

Questions remain about why the experience in Spain is so different from that in other countries. The most important question, which is still unanswered, is why despite there being some good examples of case studies and effective regulations at national level, and despite most politicians and authorities declaring that HIA should be implemented quickly in Spain, the situation is far from that seen in similar countries.

Our hypotheses are that the lack of a binding administrative process, the relative absence of HIA in academic programmes and the lack of practical experience contribute to the under-development of HIA in Spain. These factors form a vicious circle that hinders the proper implementation of HIA in this country.

Our survey specifically targeted students and young professionals in order to consider their potential role in future HIA practice. The main objective of this work is to assess the perceptions and awareness of the next generation of new young practitioners in relation to the future development of HIA in Spain. To achieve this goal, we have designed a survey for groups of young students, graduates and professionals in the fields of health, environmental science and technology. Another additional objective is to stimulate debate on the implementation of HIA by national and regional authorities in order to promote its implementation in Spain.

2. Material & methods

2.1. Survey

An online survey was designed for six different areas of an HIA. Participants were contacted in two different ways. Students at several university campuses, including final-year pharmacy students and students in environmental engineering master's programmes, were notified through public announcements on their respective virtual campuses and invited to participate in the survey. At the same time, we sent the link to the survey to two of the main professional associations in the sector, the Spanish Environmental Impact Assessment Association and the Spanish Environmental Health Association. Both associations forwarded the link to their members. We were unable to analyse the snowball effect after that action, as we did not ask participants how they found out about the survey. All information was collected anonymously and the survey, which was conducted exclusively in Spain, followed the recommendations of the Spanish data protection regulations. The questionnaire was designed taking into account the main aspects related to HIA, after several panel sessions of the Environmental Engineering Masters' programme. A pilot test was conducted with a test group of five people, two associate professors and three students, comprising three men and two women, who had varying degrees of experience with HIA.

The survey included six sections: anonymous personal details, current knowledge of HIA, regulations, public participation, equality, administrative procedures and other comments. No specific items related to the different types of HIA, nor were other practical aspects included in the questionnaire. The questionnaires were created in Google forms, with most questions involving multiple choice answers, although in some cases free text input was also allowed (Supplementary material).

Anonymous personal details were collected in the first section, including: age, gender, education level and work experience. The second section related to general knowledge about HIA and contained two open-ended free text questions and multiple-choice questions. The third section covered the role of the agents and processes involved in HIA. The fourth section addressed the implementation of HIA in Spain and, in particular, the perception of the most important aspects (health determinants) that should be analysed in any HIA. The fifth section looked at social determinants as key elements of HIA and an open text question on gender discrimination in the assessment was included. The sixth section covered an overview of the administrative process for HIA in Spain.

Two groups of students representing health science and technology were the selected target. The selection of pharmacy students as participants is particularly interesting from our point of view. Although it may not be obvious at first glance, pharmacy students represent an important group of future practitioners relevant to the field of HIA. Their training in public health and patient care provides a unique perspective on the health implications of policies and environmental changes. In addition, their understanding of medicine-environment interactions and commitment to public health enables them to make a valuable contribution to HIA processes, particularly in assessing the health effects of environmental pollutants and mitigating potential health risks through public health interventions. Furthermore, pharmacists in Spain are part of the official public health bodies and actively participate in the public participation procedures for environmental impact assessments on health issues. In Andalusia, the only region in Spain where HIA is mandatory, some of the technical staff are members of the official body for pharmacy Graduate students on Environmental engineering master's degrees was the other group, allowing us to compare their awareness of health issues.

2.2. Statistical analysis

The statistical analyses were carried out using Python for data

analysis. This is an object-oriented, interpreted and interactive programming language. It is open source and has a variety of libraries such as Pandas, Matplotlib and Seaborn. An initial graphical, descriptive boxplot analysis was performed for questions 5, 22 and 23 (supplementary material). These questions dealt with the relationship between environment and health and the importance of various health and social determinants in health impact assessment (HIA). The aim of the analysis was to visualise the concentration of the data and to gain insights into the central tendency, symmetry, skewness and outliers (Sahoo et al., 2019). This was followed by a non-parametric Friedman and Wilcoxon test. The Wilcoxon test, which can be performed either as a rank-sum test or as a signed-rank test, is a non-parametric statistical test that compares two paired groups. The tests essentially calculate the difference between the groups of pairs and analyse these differences to determine if they are statistically significantly different from each other (Rey and Neuhäuser, 2011). The Friedman test is used to compare three or more repeated measures that are not normally distributed. It is a non-parametric test and an extension of the Wilcoxon Signed-Rank Test (Cleophas and Zwinderman, 2016). Friedman-Wilcoxon was applied to questions 5, 22 and 23. A cluster analysis was performed using the elbow method to identify differences between the groups (gender, age and academic level), (Shi et al., 2020).

3. Results

3.1. General profile and level of knowledge about HIA

The questionnaire was answered by 129 people, which corresponds to a 5 % response rate. 51 % of the participants were young people under the age of 25, a large proportion of whom were studying for a post-graduate degree. Of the respondents, 34 % were over 45 years old, 15 % were between 25 and 45, and the remaining 51 % were under 25 (Fig. 1). The group was balanced in terms of gender: 51 % men and 49 % women. Most participants, 78 %, had a university degree, and almost 18 % had a postgraduate degree. The employment data showed the importance of the student group, accounting for 42 %, most of whom were currently looking for work; the other participants are split between the public and private sectors (Fig. 1).

Only a minority of participants, 14 %, indicated that they had prior knowledge of HIA tools (Fig. 2). Only 12 % were able to identify the main components of an HIA process, and most of these were PhD students who had previously attended a seminar on HIA. Despite these results, 28 % of the participants stated that they were familiar with some parts of the regulation. This contradiction could be due to the fact that most of them confused the regulation with the EIA (Fig. 2A). The response to the question about the level of knowledge about the HIA regulation differs slightly from the previous question. The number of respondents who said they knew something increased from 11 to 21 %, but most respondents mentioned EIA and not the HIA Regulation. We did not find any significant biases related to gender, educational level or professional background among the survey respondents.

3.2. HIA agents, expertise and stakeholders

The identification of stakeholders and actors in HIA processes was tested through a series of specific questions (Fig. 3). Most respondents indicated that HIA should be carried out in collaboration with various professionals, including environmental and health experts (Fig. 3A). This notion is reinforced by the next question about the area of expertise in which the HIA is conducted. 74 % of respondents said that HIA overlaps with environmental and health sciences, while 16 % said that HIA is a sub-discipline of environmental sciences and only 9 % said that health sciences is the main discipline involved in HIA. The figures show a range of opinions on which public authority should be responsible for HIA. Although 22 % of respondents thought that coordination between environmental and health authorities would be the best option, similar

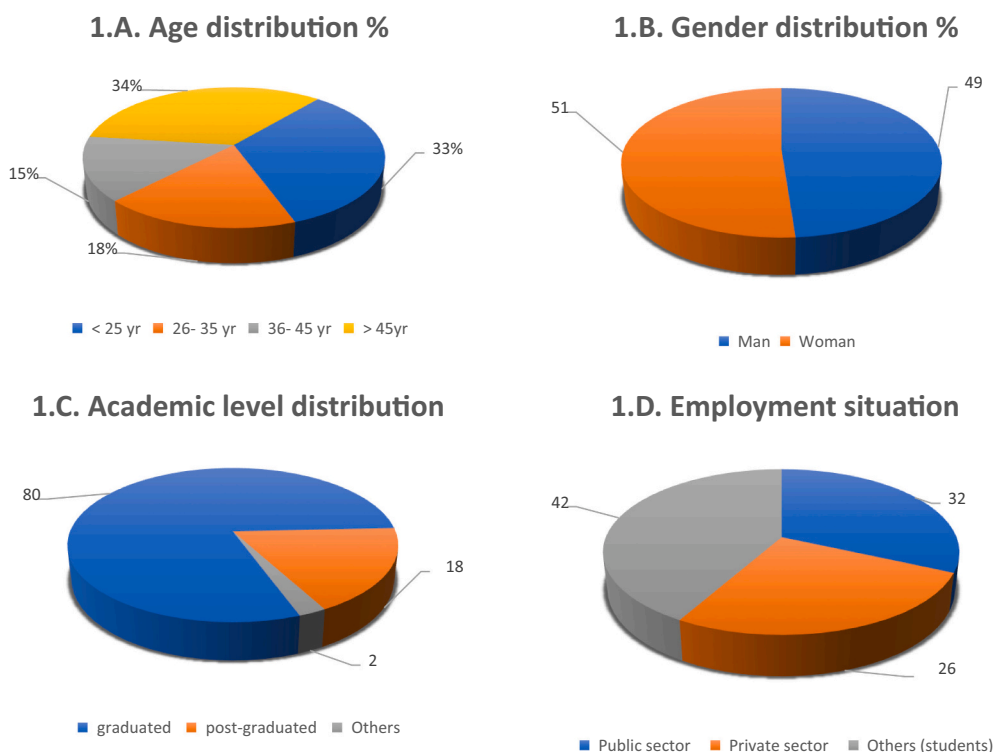


Fig. 1. General information survey. Fig. 1 A) Age distribution. Fig. 1 B) Gender distribution. Fig. 1 C) Academic level distribution. Fig. 1 D) Employment situation.

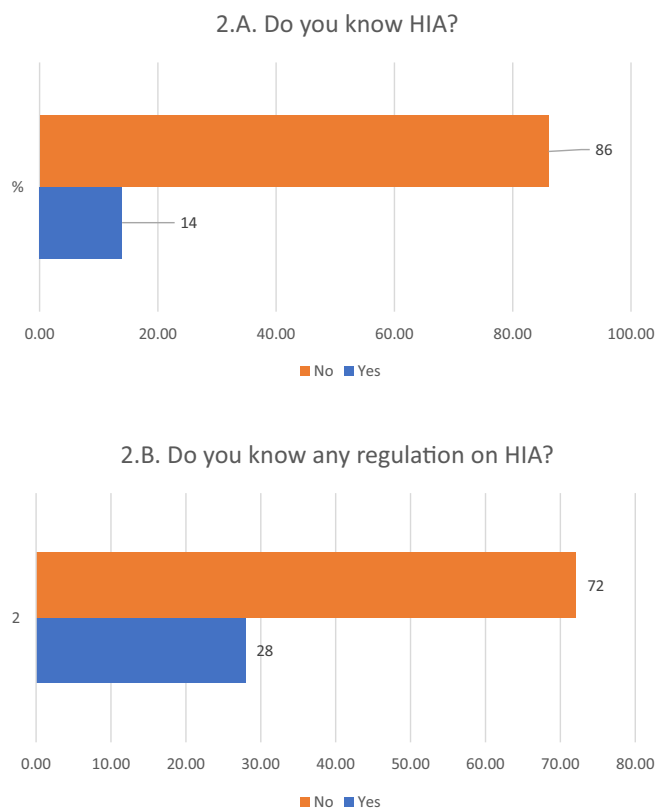


Fig. 2. Level of knowledge of HIA. 2 A). Level of knowledge of HIA. 2B) Level of knowledge of HIA regulations.

numbers expressed a preference for health authorities (26 %) or environmental authorities (19 %), while 8 % did not name a specific authority and 26 % had no opinion (Fig. 3C).

Stakeholders are an important part of the HIA process. Some responses were pre-selected and respondents could choose more than one option. Most respondents selected the option of people living near the activity or project; the second most frequently selected option was non-profit non-governmental organisations or other legal entities; and the least frequently selected option (8 %) was related to people or entities seeking to benefit from the activity or project.

Regarding the role of stakeholders in the decision-making process and the type of involvement, 65 % of respondents chose the option “People living near the activity or project”, while the second most chosen option was “Non-profit NGOs or other legal entities”. The least chosen option, selected by 15 % of respondents, referred to people or entities wanting to benefit from the activity or project.

3.3. Implementation of the HIA

In Spain, there is no specific HIA procedure at national level. Therefore, we asked respondents for their opinion on the best procedure for HIA. More than 75 % of respondents were in favour of including HIA in the EIA process. This is consistent with the lack of prior knowledge about HIA. Only 18 % suggested creating a specific new process for HIA (Fig. 4A).

A larger proportion of respondents felt that HIA should be carried out at all stages of the planning process, including plans, programmes and projects. Policies were specifically excluded from the question as they are also excluded by national legislation (Fig. 4 B).

3.4. Survey results on social and environmental determinants

Some specific aspects of HIA may overlap with environmental issues. We therefore designed a question that included a number of items that could be considered environmental or health related or both.

Participants made a clear distinction between two options regarding

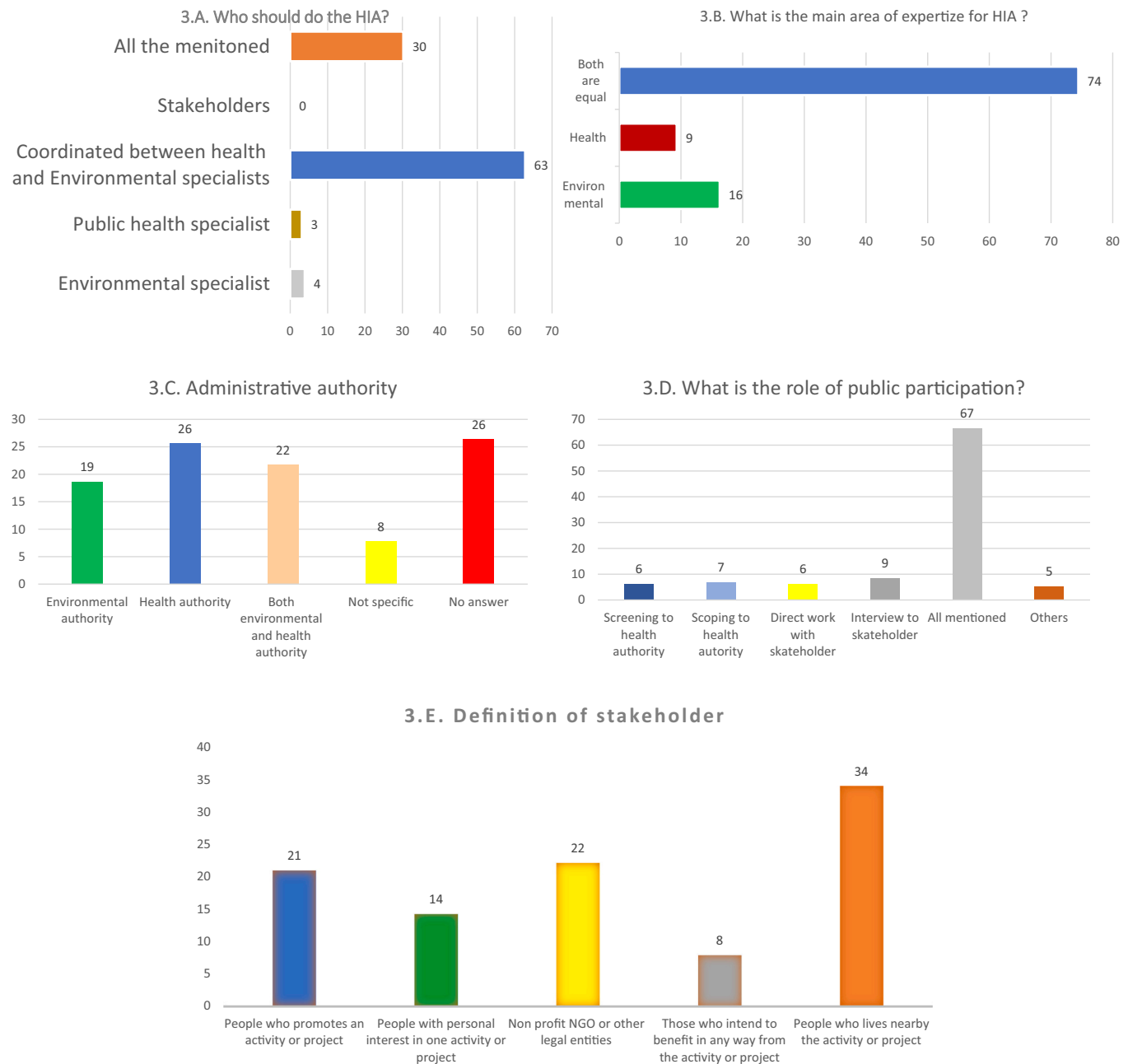


Fig. 3. Role of the actors and procedures involved in the HIA (Answers section 3.) Fig. 3A) Identification of main responsible of HIA. Fig. 3.B). Identification of expertise area in HIA. Fig. 3C). Administrative authority for HIA. Fig. 3 D). Role of public participation. Fig. 3 E) Definition of stakeholder.

the relationships between health and the environment (Fig. 5). In the first group, corresponding to relationships 1, 2 and 5, participants felt that there was a very strong relationship between environment and health. A weaker relationship was seen in option 3 (MAIPS): Environment and health can interact, but only in certain cases and at a certain time; and option 4 (MANRS), which states that health is not affected by the environment. It can be argued that respondents clearly perceive the strong interdependence between environment and health.

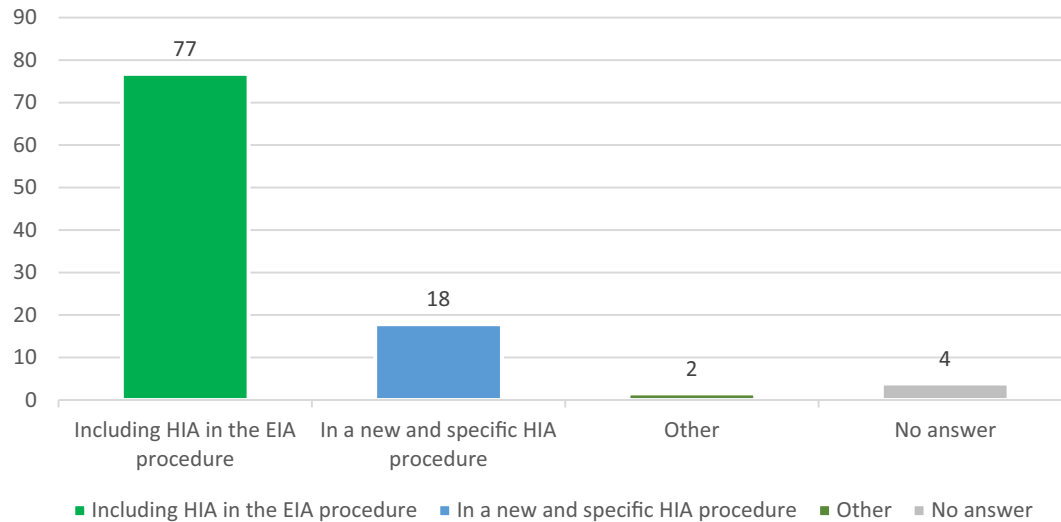
As can be seen from the application of the Friedman test (Table 1), there are significant differences in the assessment of the various possible relationships. According to the Wilcoxon test, the differences in the evaluation between relationships 1, 2 and 5, which correspond to the first group defined above, are not significant at $p = 0.05$, while the differences in the evaluation between relationships 3 and 4 are significant. This could indicate that questions 1, 2 and 5 show a certain redundancy in the aspects surveyed, while questions 3 and 4 deal with

significantly more differentiated aspects.

Regarding the importance of social determinants for health, (Fig. 6), (Table 2), most future practitioners rated most determinants as similarly important. All differences are significant for “promoting healthy living conditions”, with the exception of “tackling social inequality”, reflecting a strong correlation between these factors. The situation is similar for “Universal health care”, where there only are no significant differences for “Promoting healthy behaviours and habits”, which underlines the clear relationship between these two factors, perhaps because the health system in Spain is free and universal and is one of the fundamental rights guaranteed by the Spanish Constitution (Official State Gazette, BOE, 1978), so it is interpreted as such by the population.

Respondents consider the social determinant to be an important aspect of HIA procedures. Based on question 22, Rate the importance of the following social determinants in the HIA, where 1 means “very unimportant” and 5 means “very important”, we can see that all

4.A. How do you implement HIA procedure?



4.B. HIA at planning stage

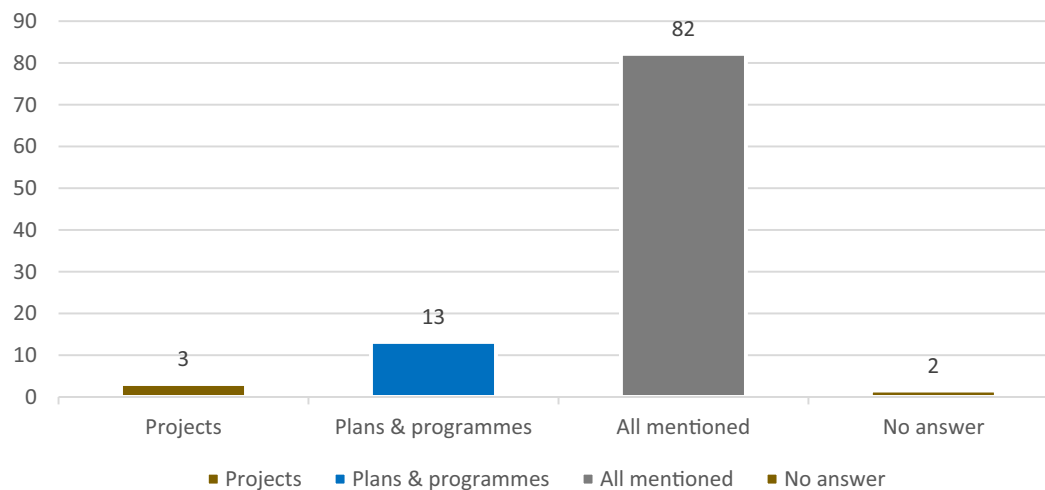


Fig. 4. Implementation of HIA (Answers for section 4). Fig. 4 A) Implementation of HIA. Fig. 4B) HIA at different planning stages.

determinants are rated as very important, and this rating is also homogeneous. No differences were found between the possible answers: Lifestyle and socioeconomic situation, attention to vulnerable groups, disease prevention and access to a favourable environment. All were rated the same (Fig. 7).

Application of the Friedman test shows that there are significant differences in the ratings of the various possible relationships. We then applied the Wilcoxon test to assess these differences pairwise (Table 3). No significant differences can be seen, except between “lifestyle and socioeconomic situation” and “disease prevention”.

4. Discussion

4.1. Survey on the perception of social and environmental determinants

Our findings highlight the significant role of both social and environmental determinants in Health Impact Assessment (HIA) and these are given an equal degree of importance by respondents. This observation is in line with the basic principles of Dahlgren and Whitehead’s

(1991) model, which has formed the basis of HIA processes for more than three decades, as Domínguez-Ares et al. (2020) noted. Inequality is still the key word in HIA processes and although there are some further developments of the Dahlgren-Whitehead model (Dahlgren and Whitehead, 2021), such as the proposal by Barton and Grant (2006), the debate in Spain is far from the drivers of the development of this model. Only in the importance of specific programmes against gender discrimination is there a greater dispersion of evaluations, perhaps due to the rapid introduction of gender issues as evaluation criteria in public health (Detels et al., 2021). In Spain, the development of an intensive gender equality policy, which has gone from laggard to pioneer, may be responsible for this issue being emphasised in the survey responses. (OECD, 2023).

Nonetheless, the importance of the environmental determinant has traditionally still had a strong influence on practitioners, for example in urban planning (Barton et al., 2009). Other authors have emphasised the importance of social determinants of health such as age, income and education on perceptions of the environment (Kardan et al., 2015). In the only example of official guidance on carrying out an HIA in urban

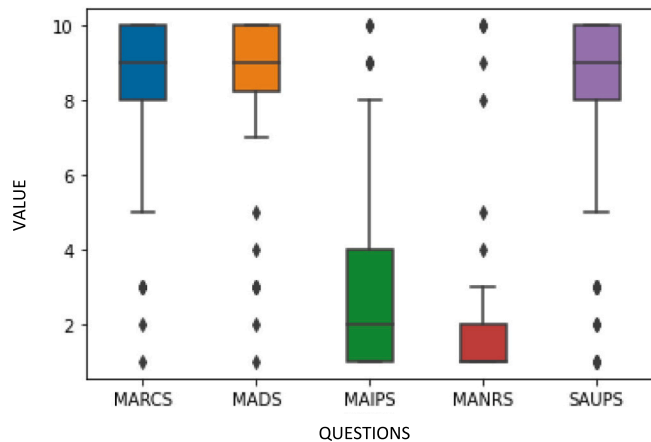


Fig. 5. Boxplot of the relationship between environment and health. ARCS: the environment is completely related to health, and they have effects on each other; MADS: the environment is a determinant of health; MAIPS: the environment and health can interact, but only in certain cases and in a timely manner; MANRS: health is not affected by the environment; SAUPS: environmental health is linked to human health.

Table 1
Results of the dependent Wilcoxon test between environment and health determinants. * $p < 0.05$.

	MARCS	MADS	MAIPS	MANRS	SAUPS
MARCS	–				
MADS	0.619	–			
MAIPS	*	*	–		
MANRS	*	*	*	–	
SAUPS	0.016	0.018	*	*	–

MARCS: the environment is completely related to health, and they have effects on each other; MADS: the environment is a determinant of health; MAIPS: the environment and health can interact, but only in certain cases and in a timely manner; MANRS: health is not affected by the environment; SAUPS: environmental health is linked to human health.

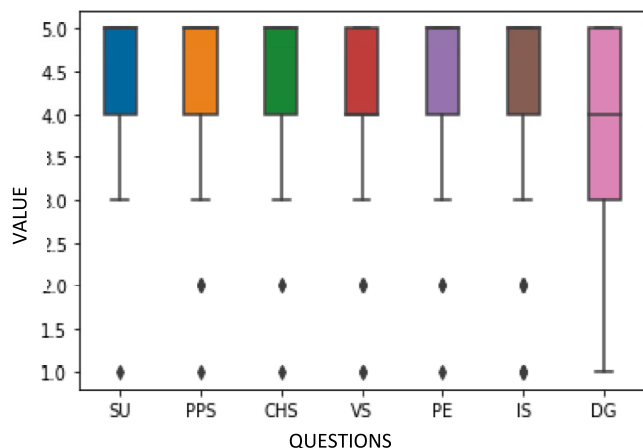


Fig. 6. Boxplot of health determinants assessment. SU, Universal Health Care; PPS, Establishment of social protection policies; CHS, Promotion of healthy behaviour's and habits; VS, Promotion of healthy homes; PE, Improvement of educational programs; IS, Fight against social inequality; DG, Programs against gender discrimination.

planning in Spain, from Andalusia (Junta de Andalucía, 2015), the guidelines recommend a protocol for the collection of environmental data closely related to public health and well-being, and the

Table 2
Results of the dependent Wilcoxon test between health determinants. * $p < 0.05$.

	SU	PPS	CHS	vs	PE	IS	DG
SU	–						
PPS	*	–					
CHS	0.018	0.032	–				
vs	*	*	*	–			
PE	*	0.103	0.102	*	–		
IS	*	0.012	*	0.342	*	–	
DG	*	*	*	*	*	*	–

SU, Universal Health Care; PPS, Establishment of social protection policies; CHS, Promotion of healthy behaviour's and habits; VS, Promotion of healthy homes; PE, Improvement of educational programs; IS, Fight against social inequality; DG, Programs against gender discrimination.

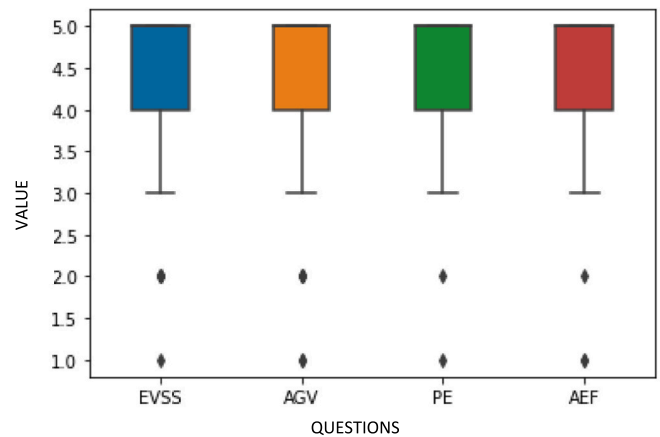


Fig. 7. Boxplot of valuation of social determinants. EVSS: lifestyle and socioeconomic situation; AGV: attention to vulnerable groups; PE: disease prevention; AEF: access to an enabling environment.

Table 3
Results of the dependent Wilcoxon test between social determinants. * $p < 0.05$.

	EVSS	AGV	PE	AEF
EVSS	–			
AGV	0.101	–		
PE	*	0.028	–	
AEF	0.031	0.632	0.075	–

EVSS: lifestyle and socioeconomic situation; AGV: attention to vulnerable groups; PE: disease prevention; AEF: access to an enabling environment.

methodological approach appears to be quite straightforward. The lack of significant biases related to gender, educational level, or professional background in our sample suggests that our findings are broadly representative of the target population.

Several factors contribute to the underdevelopment of HIA in Spain, including cultural, political and institutional barriers. Culturally, there may be limited understanding and appreciation of the importance of integrating health considerations into policy and project assessments. Politically, the lack of a unified national framework and the autonomy of regional governments has led to inconsistent implementation and prioritisation of HIA across regions. At the institutional level, the division of responsibilities between different government departments and the lack of cross-sectoral cooperation hinder the effective implementation of HIA. The lack of mandatory HIA procedures at the national level, except in Andalusia, and the limited availability of training programmes and resources for practitioners further exacerbate the situation. To overcome these barriers, concerted efforts are needed to raise awareness, develop clear guidelines and promote interdisciplinary collaboration and stakeholder involvement.

When we compare our findings to the HIA experience in other countries such as the UK, the Netherlands and Canada, we find that the successful implementation of HIA often requires a strong legislative framework, dedicated funding and comprehensive training programmes. The United Kingdom, for example, has integrated HIA into various sectors through legislation and extensive experience, while Canada benefits from well-established provincial guidelines and mandates. The experiences of these countries suggest that Spain could benefit from adopting similar strategies, including developing clear national regulations, providing targeted training for practitioners and ensuring cross-sector collaboration.

The implications of our findings for HIA education and training programmes in Spain are significant. It is crucial to design targeted educational initiatives, such as specific HIA training modules or workshops for undergraduate and graduate students that address the different types of HIA, applications and practical skills. Encouraging interdisciplinary collaboration between health sciences, engineering and other related fields will promote a multidisciplinary approach to HIA education and practice. In addition, the involvement of stakeholders from different sectors is important to raise awareness, build capacity and promote ownership of HIA processes. Knowledge dissemination efforts should focus on the production and dissemination of accessible resources that illustrate the practical use and benefits of HIA in different contexts. Finally, there is a need to advocate for the integration of HIA into policy and regulations at the national and regional levels and to work with policy makers to develop clear guidelines and mandates. Resources from organisations such as the Junta de Andalucía, ISGlobal and advisory services such as Geobiental provide valuable models and materials that can improve HIA education and implementation in Spain (Junta de Andalucía, 2023; ISGlobal, 2023; Geobiental, 2023).

4.2. Scope and future outlook

As we mentioned in our hypothesis, Spain is an unusual example of HIA compared to other industrialised countries and EU members, probably due to the lack of government regulations at the regional level and the practical lack of experience and practitioners.

Andalusia is a notable exception in Spain, since it is the only region with a comprehensive legal framework and a dedicated team of officials who carry out mandatory environmental impact assessments. In fact, as described in the introduction, some case studies have been carried out in different parts of the country. There are several reasons behind this problem. The lack of a clear legal framework in the autonomous regions seems to be an insurmountable obstacle to carrying out HIAs in Spain. Only Andalusia has a clear legal framework, a regulatory process and guidelines developed for practitioners, especially in the field of urban planning (Moya-Ruano et al., 2015). The other autonomous governments are showing interest, and in the Basque Country and Navarre there are even case studies. Despite this, Andalusia is currently an oasis in the desert.

Apart from a few seminars and professional training programmes, there is a notable lack of specialised training in this discipline in the academic curricula of health and science courses.

Broeder et al. (2017) emphasise the importance of increasing general awareness of HIA among decision makers and stakeholders, while improving public participation. Public participation is fundamental to HIA, as it uses local knowledge to uphold democratic values and empower communities. This approach is not only in line with overall public health objectives but also provides an opportunity for young practitioners to influence and shape the future of HIA practise in Spain.

To fill these gaps and promote the development of HIA in Spain, future research should focus on several key areas. Targeted educational measures are essential. This includes the development of customised HIA training modules or workshops for students and graduates. These should cover the different types of HIA, applications and practical skills. Interdisciplinary collaboration between health sciences, engineering

and other relevant disciplines should be encouraged to create a multi-disciplinary approach to HIA education and practice. Furthermore, stakeholder involvement is crucial. Stakeholders from different sectors should be actively involved in HIA processes to raise awareness, build capacity and promote ownership. Knowledge dissemination efforts should focus on the development and dissemination of accessible resources that demonstrate the practical applications and benefits of HIA in different contexts. Finally, policy advocacy is needed to integrate HIA into policies and regulations at the national and regional levels and to work with policy makers to develop clear guidelines and mandates.

Some limitations of this study should be highlighted, such as the study's response rate of 5 %, which raises concerns about the representativeness of the sample. The use of random sampling may have unintentionally biased the results towards participants who are already familiar with HIA concepts. While the online survey format facilitated data collection, it may have unintentionally excluded certain demographic groups. Efforts were made to minimise the social desirability bias associated with self-reported data. While the study focused primarily on participants' perceptions, future research may shed more light on actual implementation practices. The cross-sectional design of the study serves as a basis for the research but limits the identification of causal relationships.

In addition, some recommendations for future research will provide a clearer picture of the situation in Spain. For example, future HIA research should focus on several key areas to improve understanding and implementation. First, longitudinal studies are needed to track changes in awareness, knowledge and the practice of health impact assessment over time to gain insights into trends and barriers. Comparative analyses should be conducted to compare HIA practices and policies in different regions of Spain and internationally to identify best practices and challenges. Qualitative research, such as interviews and focus groups, is essential to gain deeper insights into stakeholders' perspectives on HIA implementation. Intervention studies should be designed and evaluated to promote awareness of HIA and mainstreaming in relevant sectors, while stakeholder engagement is crucial to foster collaboration and support. Tailored capacity for building initiatives is needed to empower stakeholders involved in HIA, and policy analysis can identify gaps and opportunities to strengthen HIA mandates and frameworks. By addressing these areas, future research can contribute to evidence-based decision-making and promote health equity in Spain.

5. Conclusions

HIA is far from being considered a mature decision-making process in Spain, although it is regulated by the Public Health Law. There are several reasons for this, including the following three aspects: the lack of a clear legal framework and administrative procedures and the lack of a clear regulatory authority, which means that there is limited experience in this field. In addition, the public knows very little about this useful tool.

The awareness and perception of HIA in Spain needs a strong boost from different perspectives; thus policymakers should develop Public Health Law through a new royal decree; the autonomous governments should develop new regulations following the path forged by Andalusia. At the same time, new guidelines and specific training courses could help practitioners; and the universities should create new academic programmes about HIA for graduated students.

It should be mandatory for the authorities to include HIA in the political agenda in order to improve interdisciplinary collaboration between all the agents involved in HIA: stakeholders, academia, policy-makers and health authorities. All the previously mentioned, could boost awareness about HIA, which is the most effective tool for promoting the rapid development of HIA in Spain.

Looking at the survey results, it is clear that despite the current challenges, there is considerable interest in HIA among future practitioners, indicating a potential area for growth and increased

engagement. The optimistic scenario is that the governments of the autonomous regions will create a clear legal framework and introduce specific academic programmes for this discipline. Under these hypothetical new conditions, HIA could undergo rapid and stable development and have a bright future in Spain.

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During the preparation of this work, the authors used *InstaTex* in order to review the English grammar. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Declaration of competing interest

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Miguel Angel Casermeiro reports article publishing charges was provided by Complutense University of Madrid. Miguel Angel Casermeiro reports a relationship with Complutense University of Madrid that includes: employment. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

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Miguel Ángel Casermeiro Martínez, After the degree in Pharmacy (*summa cum laude*) and A M.Sc. on Environmental Impact Assessment, and PH. D. in Soil Science 1995 with a laureate Thesis about soil degradation (Juan Martel Prize). Since 1997 I am staff, under different positions at Soil Science Department of the Universidad Complutense de Madrid. I am co-director of the Research group *Fitosolum* focus in the research of the soil and plant relationships in different scenarios natural and under the effects of a human perturbations as well as the environmental impact assessment. I had several collaborations with nationals and international colleagues in this field. I pointed out two research stays in the laboratory of Professor Schimel, as well as the collaboration with the Research institute of transport (TRANSIT) of the UPM, both of them finished with highly cited papers.

I have been principal investigator or participant in over 20 research competitive projects, and research transference projects with more than 20 research contracts signed with our research group. Actually, I am the secretary of the Spanish society for Impact Assessment, affiliate of IAIA.