

## STAKEHOLDER ANALYSIS TO IMPROVE THE NATIONAL CONTROL PROGRAM OF CYSTIC ECHINOCOCCOSIS IN MOROCCO

Aouatif Saadi <sup>a,b,\*</sup>, Hamid Sahibi<sup>a</sup>, Severine Thys<sup>c</sup>, Tanguy Marcotty<sup>d</sup>, Hind Filali<sup>e</sup>, Fatimaezzahra Amarir <sup>a</sup>, Abdelkbir Rhalem <sup>a</sup>, Nathalie Kirschvink <sup>d</sup>, Nicolas Antoine-Moussiaux <sup>b</sup>

<sup>a</sup> *Department of Pathology and Veterinary Public Health, Parasitological Unit, Agronomic and Veterinary Institute Hassan II, Rabat, Morocco*

<sup>b</sup> *Fundamental and Applied Research for Animals and Health (FARAH), Faculty of Veterinary Medicine, University of Liege, Belgium*

<sup>c</sup> *Department of Vaccinology, Faculty of Medicine and Health Sciences, University of Antwerp, Belgium*

<sup>d</sup> *Integrated Veterinary Research Unit, Department of Veterinary Medicine, University of Namur, Belgium*

<sup>e</sup> *National School of Public Health. Ministry of Health, Rabat, Morocco*

\* *Corresponding author at: Department of Pathology and Veterinary Public Health, Parasitological Unit, Agronomic and Veterinary Institute Hassan II, Madinat Al Irfane, B.P. 6202, Rabat, Morocco.*

*E-mail address: aouatif.saadi@doct.uliege.be (A. Saadi).*

**KEYWORDS:** Cystic echinococcosis ; Morocco ; National hydatidosis control programme ; Stakeholder analysis

### ABSTRACT

Cystic echinococcosis (CE) is a major zoonosis in Morocco. Despite a national hydatidosis control programme (NHCP) established in 2005, CE burden is still high nationwide. The aim of this study was to carry out an NHCP stakeholders' analysis to identify weak points and propose improvement strategies. In total, 164 semi-structured interviews were carried out with national and local stakeholder representatives, and one stakeholders' workshop was organized. Classical categories of stakeholder analysis (i.e. involvement, interest, importance, influence, priority, and power) were semi-quantified. Based on these categories, an analytical framework was proposed, by selecting elements from the stakeholder analysis, to structure the assessment around three criteria: measure appropriation, political agency, and socio-technical agency. Besides specific weak points of the NHCP, the analysis highlighted the complexity of implementing a zoonotic disease control programme due to the involvement of many different stakeholders. Finally, this study provides a simplified stakeholder analysis method that could be used to assess other health programmes targeting zoonotic diseases, in Morocco and in similar countries.

## 1. Introduction

Cystic echinococcosis (CE) is a neglected zoonotic parasitic disease caused by the tapeworm *Echinococcus granulosus*. Dogs and wild canids harbour the adult parasite in their intestine (final hosts), while the larval form is found in tissues and viscera of various ungulates (intermediate hosts). Humans may be infected as an intermediate host and epidemiological dead-end (Thompson and McManus, 2002). CE is one of the most prevalent and costly parasitic diseases in the world (OMS/OIE, 2002). The annual costs associated with the treatment of human cases and with livestock losses caused by this zoonosis are estimated at US \$ 3 billion (OMS. Echinococcosse, 2020).

In Morocco, CE is endemic (Chebli et al., 2017). Its estimated prevalence in dogs ranges between 23.5 % and 38.8 % (owned dogs) and between 51.3 % and 68.5 % (stray dogs) (Amarir et al., 2020), and in humans is approximately 1.9 % (Chebli et al., 2017). However, human CE incidence is underestimated in Morocco because only surgical cases are recorded, but many people with hydatid cysts are not treated by surgery, and therefore will not be reported (Chebli et al., 2017; Mansouri et al., 2015). In livestock, CE prevalence at slaughterhouses is 12.4 % in cattle, 8.7 % in camels, 8.4 % in sheep, and 4.7 % in goats (Saadi et al., 2020). A national hydatidosis control programme (NHCP) was established in 2005 and officially launched in 2007. An inter-ministerial committee was created, gathering the Ministries of Health, of Agriculture, and of the Interior. It elaborated an information guide that provides the necessary epidemiological knowledge (Comité interministériel de lutte contre L'Hydatidose, 2007), and supervises and monitors the programme implementation at the national and regional levels. The NHCP is based on two main strategic axes: i) preventive measures, and ii) treatment of the human disease (Comite interministeriel de lutte contre L'Hydatidose, 2007). Specifically, a set of preventive measures are focused on interrupting the parasite life cycle, protecting livestock, and controlling the dog population, particularly by improving slaughterhouse sanitary standards, controlling stray dogs, and deworming dogs. Activities related to this axis are organized and supervised by the Ministry of Agriculture and Ministry of the Interior. The CE epidemiological surveillance at slaughterhouse and infected offal disposal are managed by the Ministry of Agriculture through the National Office for Food Safety (ONSSA). The dog population and slaughterhouse controls are managed by the Ministry of the Interior via the local municipal hygiene offices. On the other hand, the epidemiological surveillance, detection and treatment of hydatid cysts in humans are organized by the Ministry of Health through the local health delegations and public hospitals. Raising awareness on CE importance in the population is shared by the three Ministries. In addition, the Ministry of Education has been involved in the preparation of an awareness brochure for children, and the Ministry of Islamic Affairs carries out awareness campaigns in the mosques.

The NHCP aim was to halve the incidence of CE by 2015 (Azzouzi, 2009). However, the available data suggest that this objective has not been reached yet. Indeed, the yearly losses due to CE were estimated in Morocco at 73 million USD (54–92 million USD) for the 2011–2014 period (Saadi et al., 2020). Moreover, a recent study to estimate the prevalence of human abdominal CE in the Mid-Atlas

(hyper-endemic region) by ultrasonography showed an overall prevalence of 1.9 % (Chebli et al., 2017). Another study in the Sidi Kacem region estimated an overall infection prevalence of 42.9 % in cattle, 11.0 % in sheep, and 1.5 % in goats (El Berbri et al., 2015). No formal evaluation of the NHCP has been done yet. However, such assessment is crucial for the programme success because it could improve compliance with the established standards, provide stakeholders with an opportunity to voice their opinions, and mobilize more resources to achieve the stated goals (Federation internationale des Societes de la Croix-Rouge et du Croissant-Rouge, 2011).

The objective of this study was to generate evidences that could be used to improve the CE control strategy by exploring the relationships among the different actors involved. To this aim, a stakeholder analysis was carried out to provide a multidimensional visualization of the different actors involved in NHCP implementation (Schmeer, 2000; Sifer et al., 2011). A stakeholder analysis identifies the interests of all actors who might influence or be affected by the NHCP. This analysis could help to understand and stimulate the stakeholders' participation at the different stages of the programme, as well as to identify risks and conflicts that may arise, relationships and improvement opportunities (Department for International Development, 2003).

Despite the importance of stakeholder analysis as a monitoring tool, it has been rarely used in research on CE, possibly due to its relative complexity and lack of standardization. Therefore, this study proposes a simplified approach with three assessment criteria, based on the indepth analysis of stakeholders, to understand the reasons of the NHCP relative failure, and to formulate improvement strategies.

## 2. Materials and methods

### 2.1. ETHICAL APPROVAL AND CONSENT TO PARTICIPATE

Close attention was paid to ethical considerations by following the Guidelines for Research Ethics in the Social Sciences, Humanities, Law and Theology (Norwegian National Research Ethics Committees, 2016). In a formal interview setting, the right to informed consent was strictly observed: verbal consent was sought from the respondents after giving them extensive information on the interview objective, the estimated time required, and the study outcome. Measures to safeguard the responders' anonymity and confidentiality were observed at all times during the fieldwork and data analysis. This work was authorized by the Department of Pathology and Veterinary Public Health Committee, Agronomic and Veterinary Institute Hassan II, Rabat, Morocco, in 2015.

### 2.2. STUDY AREAS

This study was undertaken from 2016 to 2018. Seven Moroccan regions were visited: Rabat (central area, the administrative capital where the ministries are located), Bel Ksiri (near the capital with high CE in humans and animals), Khenifra (one the regions with the highest human CE incidence), Agadir (a region with high CE prevalence in humans and animals, but little studied), and Laayoune, Tantan

and Guelmim (three regions with low CE incidence in humans). The seven areas differ in climate, human habits, and geography.

### **2.3. FIELD INVESTIGATIONS: OBSERVATIONS, STAKEHOLDERS' LIST, AND INTERVIEWS**

First, slaughterhouses, hospitals and provincial health delegations in the study areas were visited and observed. An initial list of stakeholders was established that included the institutions playing a direct or indirect role in the NHCP, as described in the NHCP guide: the Ministry of Health, Ministry of Agriculture, Ministry of the Interior, Ministry of Education, and Ministry of Islamic Affairs. One focus group discussion was organized to gather representatives of all five ministries around the following topics: NHCP creation, organizations and structures that work in accordance or in opposition with them, and their evaluation of the NHCP. This discussion also allowed completing the stakeholders' list.

Then, the semi-structured interview guide was developed. Interviewees were identified based on the initial stakeholder list that was subsequently enlarged through respondent-driven sampling when participants identified other people or institutions that could be included in the study (Patton, 1990). The interview guide was based on the six classical categories of stakeholder analysis: involvement, interest, importance, influence, priority, and power (Schmeer, 2000; Seder- eviciute and Valentini, 2011; Bryson, 2004). Among these categories, three can be used to define the stakeholder's role in a programme: involvement, influence, and power. "Involvement" describes the degree of centrality of a stakeholder in the programme. "Influence" is the stakeholder's capacity to mobilize human and material resources to implement the programme, in institutions or in the civil society. "Power" corresponds to the stakeholder's political capacity to interact with other actors to contribute to the programme success or failure. In function of its power level, one actor may challenge other actors, manage other actors, or impulse new orientations to the programme. The other three categories describe the programme place within the stakeholder's activities: interests, priority, and importance. "Interests" include any element that stimulate the stakeholder's involvement. It covers the various stakeholders' activities that could be influenced positively by the programme. "Priority" describes the relative importance given to the NHCP among the stakeholder's different goals. Priority is the result of many symbolic, political, or instrumental factors. Finally, "importance" defines how the programme affects the stakeholder's own income or work. Therefore, "importance" gives an explicit account of the source of instrumental priority.

The interview guide was tested with various stakeholders (one veterinarian, one medical doctor, one breeder, and one slaughterer) to determine whether i) the interviewees were comfortable and understood the questions; ii) the answers provided the sought information; and iii) the interview duration was appropriate (Schmeer, 2000).

The focus group discussion and all semi-structured interviews were face-to-face. The study team was introduced and the study aim was explained before the interviews/discussion. A verbal consent was obtained from each participant, and anonymity was guaranteed to all interviewees. To animate

the focus discussion group, a researcher acted as moderator (SA) and a reporter took notes. The discussion and interviews were recorded. The interviews were in Arabic or Berber language, and lasted from 20 to 45 min (median time = 32 min).

#### **2.4. WORKSHOP FOR NHCP PARTICIPATORY EVALUATION**

The identified stakeholders were invited to a 1-day workshop in Rabat to share their expertise and experience on CE control. Civil servants were invited from the Ministries of Health (n = 2), Agriculture (n = 2), Interior (n = 1), Education (n = 2) and Islamic Affairs (n = 1). Researchers from the Faculty of Medicine (n = 3), National Institute of Hygiene (n = 1), National School of Public Health (n = 2), Hassan II Agronomic and Veterinary Institute (n = 5), and Institute of Tropical Medicine Antwerp (Belgium) (n = 3) were also invited. The workshop took place in a room, and started with the presentation of the first results from the interviews and their discussion by all invited stakeholders. Participants were then invited to form groups (four to seven participants from different ministries and research institutions). Each group was asked to analyse and summarize the following topics: stakeholders' identification, obstacles to NHCP implementation, coordination between stakeholders, and proposals for NHCP improvement. Each group's analyses were discussed with the other groups. At the meeting end, the results were summarized, discussed and validated by all participants. During the workshop, new stakeholders were identified, and participants in this workshop were asked to be interviewed.

#### **2.5. SECOND FIELD INVESTIGATION**

The newly identified stakeholders also were interviewed using the same semi-structured interview guide. In total, 164 interviews were carried out during this study (Table 1): 91 people (internal and intermediate stakeholders) were interviewed before the workshop in Rabat, and 22 and 51 during and after the workshop (external stakeholders), respectively.

#### **2.6. DATA ANALYSIS**

All interviews were transcribed in their original language and then translated into French, the only language known by all research team members. For the present analysis, selected excerpts were translated into English. Recordings were listened and transcripts were reviewed by the research team to check their quality and completeness. Transcripts were then analysed by software-assisted textual analysis, using the RQDA package in the R software. Responses were coded and grouped in six themes: involvement, interest, influence, priority, power and importance. For each category, subcategories were created to group similar responses. These categories and subcategories were analysed in the interview of each stakeholder. For presenting the results in the form of graphs, the answers, grouped in qualitatively described subcategories, received a standardized notation that translated the stakeholder's status for each of the six themes (Table 2). The responses concerning involvement and power (for the stakeholder's role-centred variables) and importance and priority (for the programme place-centred variables) were noted using a scale from 0 to 3. The responses

concerning interest and influence were noted by summing the points ascribed to the different categories (each category had the same weight). When several actors from the same institution were interviewed, their individual answers were semi-quantified and then, the mean value for the institution was calculated.

Among all possible analyses generated by the responses concerning the six themes, three criteria were defined to describe the programme place in the stakeholder's activities and the stakeholder's role in the programme (Fig. 1). Each criterion combined one theme centred on the stakeholder's role and one theme on the programme's place. The first assessment criterion was the appropriation of control measures. Appropriation was assessed by clustering measures according to their score of "interest" for the stakeholders and of their "involvement" in their implementation. Values mobilized were the means of each measure for all stakeholders. The second assessment criterion, termed "political agency", mapped the stakeholders' diversity according to their "power"

on other stakeholders and the "priority" they ascribed to CE control. The third assessment criterion, termed "socio-technical agency", mapped the stakeholders' diversity according to their "influence" on the programme implementation (mobilization of resources and people) and the programme "importance" for their own income or work. For these last two criteria, the values were the means per stakeholder for all control measures.

## **2.7. DATA VALIDATION**

The criteria proposed by Guba and Lincoln for judging the validity of qualitative research were followed to assess the study results: credibility, transferability, dependability and confirmability (Lincoln and Guba, 1985). All team members validated the data credibility because the data collected were enough to understand the research subject from the point of view of all interviewed participants. Transferability was respected by carefully describing the research context and process in order to identify the result part/dimensions that can be transferred to (or compared with) other zoonoses or other regions or countries. Dependability was guaranteed by the structured method of data codification and classification by the construction of themes and sub-themes. Confirmability was ensured by the neutrality of the collected data and their interpretation.

**Table 1.** List of interviewed stakeholders, adapted from the Schmeer's model (Schmeer, 2000). NHCP: National hydatidosis control programme; WHO: World Health Organization; OIE: World Organization for Animal Health; CE: Cystic echinococcosis.

Sector	Sub-Sector	Internal / Intermediate/ External stakeholder	Number of interviewed representatives	Inclusion motif /relation to the NHCP		
International agencies/ Donors	WHO	External	1	External financial and knowledge support		
	OIE	External	1			
National Political	Elected politicians, local authorities	External	3	Implementing executive plans and managing municipal budgets		
		Internal	1			
	Central level	Ministry of Agriculture	Internal	1	Members of the inter-ministerial committee for CE control, responsible for the implementation of the NHCP executive plan and the coordination of institutions at the national and local level	
		Ministry of the Interior	Internal	1		
Public entities for NHCP implementation	Provincial and local levels	National Office for Food Safety	Internal	10	Responsible for implementing CE control measures. Receiving orders and budget from central- level public entities	
		Health delegations	Internal	11		
		Public Hospitals	Internal	17		
		Local Authorities	Internal	5		
		Municipal Hygiene Offices	Internal	10		
Public entities other than those supervising NHCP implementation	Ministry of Education	Central level	Intermediate	1	Collaborating with the entities in charge of NHCP for the improvement and the implementation of awareness raising campaigns	
		School teachers	Intermediate	19		
Public Sector	Associations	Ministry of Islamic Affairs	Central level	Intermediate	1	Directly affected by the economic losses caused by CE.
		Imams of mosques	Intermediate	14		
		National Association of Cattle Breeders	External	5		
Private Sector	Private-sector	National Association of Ovine and Caprine Breeders	External	4	Holding an interest in controlling this zoonosis	
		physicians	External	14		
		veterinarians	External	12		
		Researchers	External	11		
	Slaughterers	External	22	Can protest and lobby for fund mobilization		
Total				164		



**Table 2.** Categories, subcategories and scoring

Category	Subcategory	Score	Notation Type
<b>Stakeholder's role in the programme</b>			
Involvement	Not involved: their institution has no role to play	0	Scale of notation
	Little involved: their institution plays an indirect role	1	
	Involved: their institution plays a key role	2	
	Highly involved: their institution is responsible for NHCP	3	
Power	No power	0	Sum of all points
	Challenge other actors	1	
	Manage other actors	2	
	May propose new procedures	3	
Influence	Indirect influence through other actors	0	Sum of all points
	Mobilization of resources	1	
	Mobilization of public institutions	1	
	Mobilization of civil society	1	
<b>Programme role in the stakeholders' activities</b>			
Priority	NHCP has no place in their projects	0	Scale of notation
	NHCP is included in their activities, but it is not considered a priority	1	
	NHCP is included in their activities and it is a priority	2	
	NHCP is a top priority	3	
	NHCP has no importance	0	
Importance	NHCP does not influence their activity, but can improve the quality of their partners' work	1	Points to be summed
	NHCP can improve the quality of their work or income	2	
	NHCP is very important for the quality of their work and income	3	
	Economic: CE control could improve their economic prospects, benefits, and the quality of some product	1	
	Social: CE control improves their quality of life, wellbeing	1	
Interests	Work: CE control improves their working life, people will be more satisfied with their work	1	Points to be summed
	Environment: CE control improves environmental protection, stops CE spread, prevents infection of the final and intermediate hosts	1	
	Health: CE control improves community health, prevents infection in humans	1	
	Safety and security: disease surveillance programmes can improve the health of at- risk populations and prevent economic losses in animals	1	

## 3. Results

### 3.1. STAKEHOLDERS' IDENTIFICATION

Stakeholders were categorized in internal, intermediate and external stakeholders. Internal stakeholders are responsible for NHCP implementation; intermediate stakeholders work in



collaboration with the internal stakeholders; and external stakeholders may provide funds, be in competition with the programme, or show a special interest for CE control without being directly involved in the NHCP (Mayers, 2005) (Fig. 2). A set of institutional stakeholders constituted the internal and intermediate stakeholders. The Ministries of Health, Agriculture and the Interior, which organized the NHCP and supervise its implementation, represented the internal stakeholders. The Ministries of Education and Islamic Affairs and the media, which work in collaboration with the inter-ministerial CE control committee and contribute to the dissemination of messages concerning CE, were considered as intermediate stakeholders. WHO, which funds the NHCP, was considered an external stakeholder that provided inputs to the programme. OIE (World Organization for Animal Health) was not included in the NHCP, but could contribute funding or knowledge, and therefore was classified as external stakeholder. Individuals and field actors were considered as external stakeholders. This group included stakeholders that suffered CE-linked economic losses, such as slaughterers (loss of infected offal) and breeders (animal productivity and economic losses). Breeders were represented by large associations: National Association of Cattle Breeders (ANEB) and National Association of Sheep and Goat Breeders (ANOC). Elected politicians were considered to be external stakeholders because they manage municipal budgets and allocate it to uses that might compete with CE control. Finally, researchers, private-sector physicians and private-sector veterinarians also were included in the external stakeholder category because they are in direct and almost permanent contact with the population, show relevant skills and knowledge, and can convey messages to the population, but are not formally involved in the NHCP.

### **3.2. MEASURE OF APPROPRIATION: STAKEHOLDERS' INTEREST AND INVOLVEMENT**

The NHCP is based on six control measures that could be categorized in two groups on the basis of the stakeholders' degree of interest and involvement: i) appropriated measures (offal seizure, slaughterhouse development, and treatment of human cases) for which the stakeholders felt well involved and stated interests, and ii) neglected measures (control of the dog population, dog deworming, and awareness raising) that did not attract the interest of the stakeholders who did not feel involved in their implementation (Fig. 3).

### **3.3. STAKEHOLDERS' SOCIO-TECHNICAL AGENCY: INFLUENCE ON THE NHCP AND PROGRAMME IMPORTANCE**

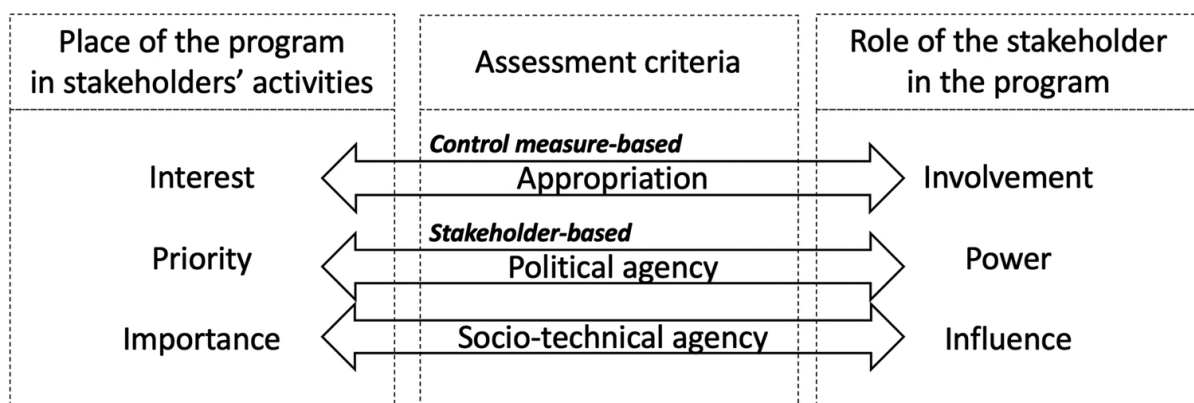
Each stakeholder could be defined in function of its influence on the NHCP and the programme importance for that stakeholder (Fig. 4). Most internal stakeholders were concentrated in the "high importance - high influence" group (Fig. 4B), with the exception of the municipal hygiene offices for which the programme was less important, although they had high influence (Fig. 4D). Some stakeholders considered the NHCP very important, but had low influence on its implementation (i.e. slaughterers and breeders' associations) (Fig. 4A). Intermediate stakeholders were all in the "low influence - low importance" group (Fig. 4C) because their role in NHCP was focused on improving the quality of the work performed by internal stakeholders, and their influence was based on the

civil society mobilization. External stakeholders who provide inputs to the NHCP (OIE and WHO) had a medium influence and medium importance. External stakeholders, who could compete with the programme’s resources (i.e. politicians) or who provided inputs in the form of active participation in awareness raising (i.e. researchers, privatesector physicians and private-sector veterinarians) were in the “low influence - low importance” group (Fig. 4C).

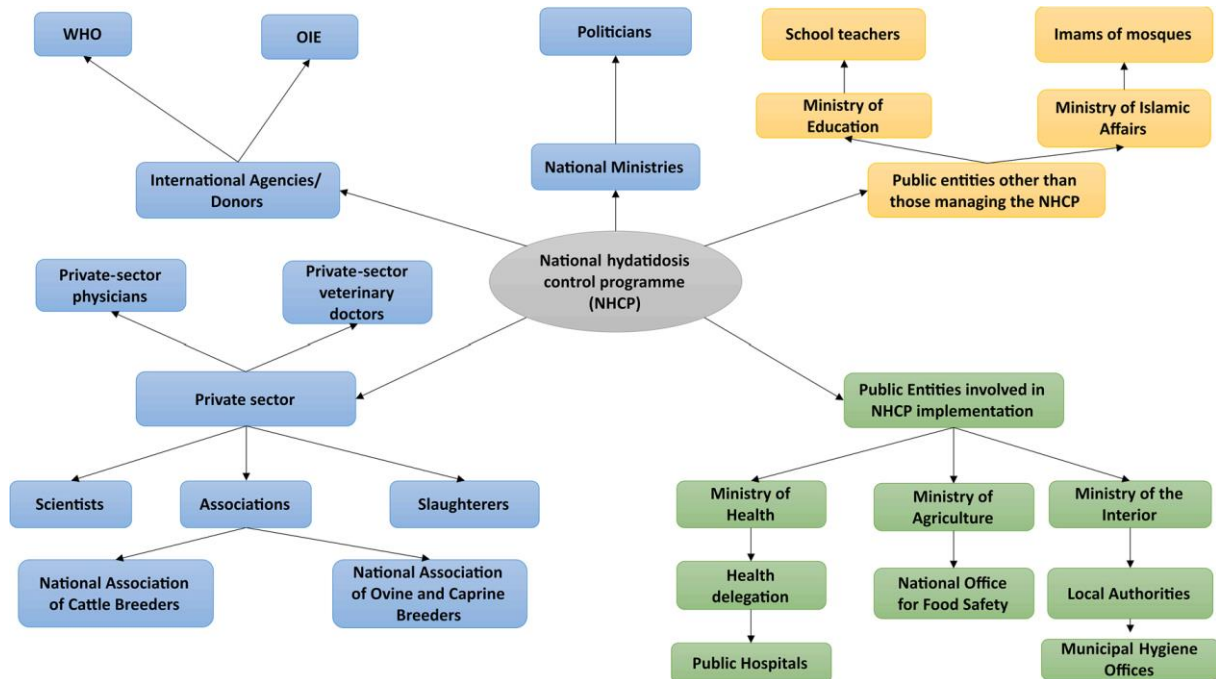
### 3.4. STAKEHOLDERS’ POLITICAL AGENCY: NHCP PRIORITY LEVEL AND STAKEHOLDERS’ POWER

Stakeholders could also be classified on the basis of the priority they ascribed to the NHCP in their activities and their power (Fig. 5). Internal stakeholders had huge power in the NHCP, but only the ONSSA considered CE a high priority. Political stakeholders had a large power, but they did not consider NHCP a priority. Some external stakeholders (slaughterers, WHO and municipal hygiene offices) thought that NHCP was a high priority, but their power was limited. Intermediate stakeholders and the other external stakeholders were in the “low power - low priority” group.

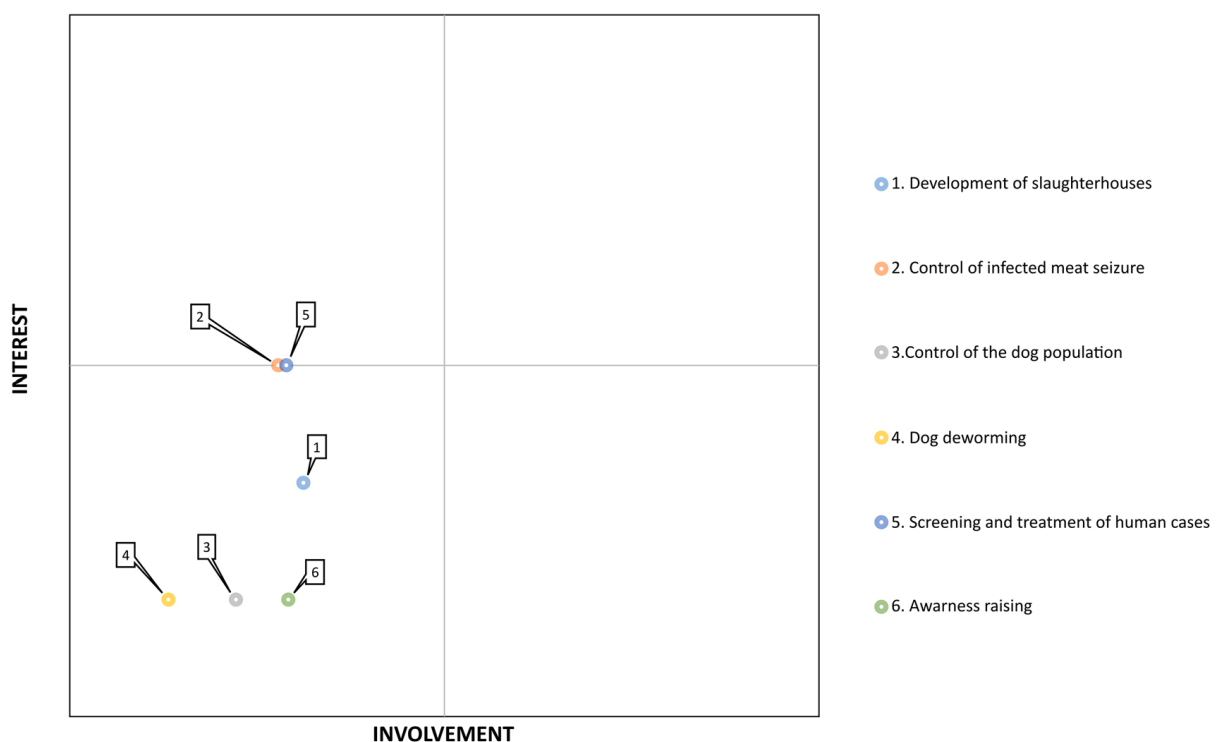
**Figure 1.** Analytical framework to define the three assessment criteria from the two-dimensional mapping of stakeholders and measures based on the six classical variables that compose the stakeholder analysis.



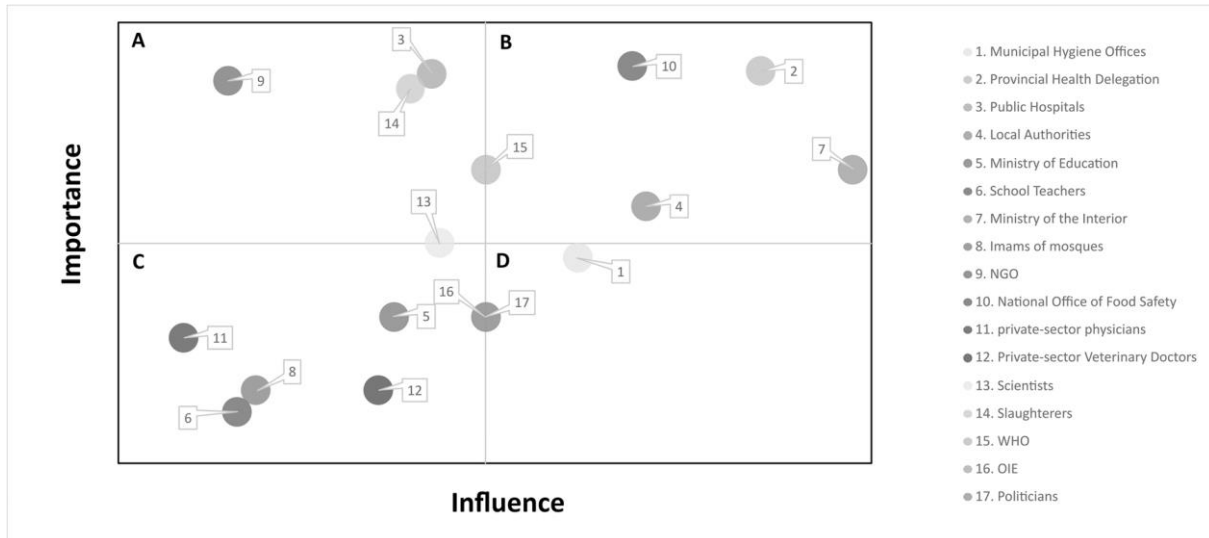
**Figure 2.** Stakeholders' map. Green: Internal Stakeholders; Orange: Intermediate Stakeholders; Blue: External Stakeholders (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article).



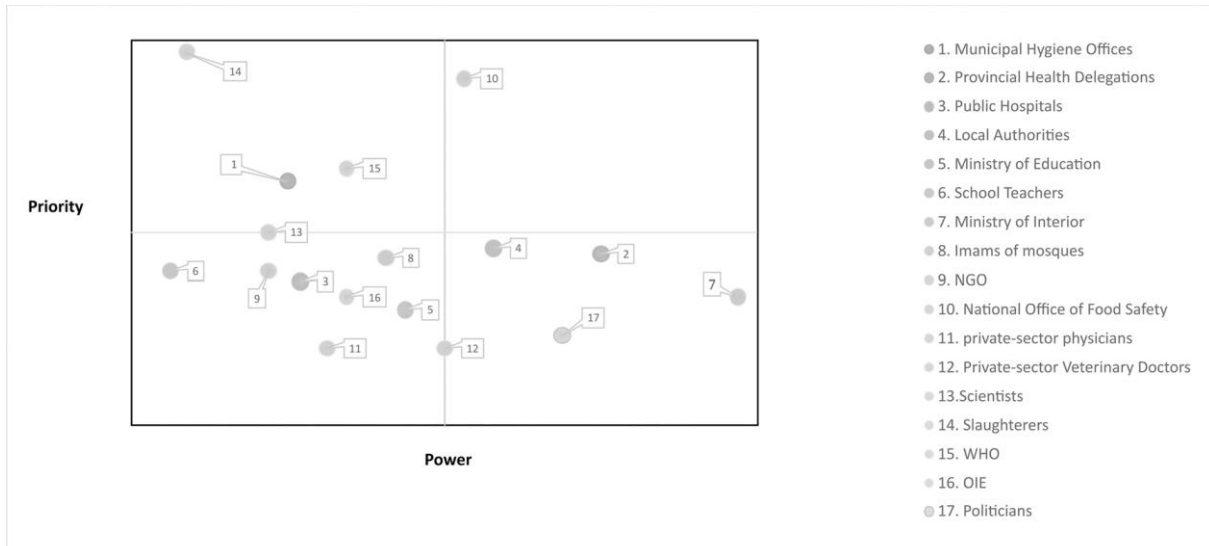
**Figure 3.** Scatter plot of the six NHCP measures according to the stakeholders' interest and involvement in their implementation.



**Figure 4.** Scatter plot to classify the stakeholders according to their influence on NHCP implementation (mobilization of resources and people) and the importance they ascribe to the programme in the framework of their activities



**Figure 5.** Scatter plot showing the stakeholders' distribution according to their power on the NHCP and the priority they ascribe to the programme in the framework of their activities.



## 4. Discussion

The burden of human and animal CE is very high in Morocco, despite the nationwide control efforts through the NHCP, officially launched in 2007 (Mansouri et al., 2015). Here, a stakeholder analysis was carried out to better understand NHCP challenges in view of its improvement. By semi-

quantifying qualitative data, this method allowed visualizing the results, thus guiding the data analysis and result communication.

The study revealed a complex institutional network of public- and private-sector stakeholders. Indeed, by adopting a problem-centred viewpoint, the stakeholder analysis transcends the boundaries of the economic, political, administrative and citizen realms by joining them within analytical categories (Bonnafeous-Boucher and Pesqueux, 2006). By highlighting the diversity of actors, it revealed the complexity of a programme targeting a zoonotic disease in which both animal and human health actors are implicated, and covering public health, economic activity (animal production), and environmental management (roaming dog populations). This intermingling entails an additional complexity due to the diversity of required behavioural changes that might lead to gaps in awareness, to conflicts between individual interests and public good, and that might be hindered by cultural factors and socio-political divides among the involved stakeholders.

The list of stakeholders identified in this study was much larger compared to those cited in the NHCP. The identification and the involvement of all stakeholders in a project are strategic and essential for its effectiveness (OMS/OIE, 2002; Culyer, 2005). The current NHCP failed to identify and involve all external stakeholders (OIE, slaughterers, breeder associations, local politicians, researchers, private-sector physicians and private-sectors veterinarians), with the exception of the WHO that contributed to the funding. Although the internal stakeholders are obvious key actors in leading the project, their effectiveness relies massively on external stakeholders who play the role of supporters and promoters (Lewis et al., 2001). Therefore, the sustained involvement of external stakeholders is necessary for a project success (Zott and Huy, 2007; Schlange, 2006). Overall, the close relationships between internal and intermediate/external stakeholders promote the development of knowledge, complementary resources, and social networks, constituting means and processes for effective governance (Morsing and Schultz, 2006). For instance, in the present case, the collaboration with academic researchers could lead to the development of new technologies and innovations in CE control (Marcotty et al., 2013).

The classification of measures according to their degree of appropriation highlighted the relative neglect of some of them (i.e. dog population control, dog deworming, and public awareness raising). In this case, like in any control matrix, the lack of commitment or the poor execution of measures can seriously hinder the whole project (OMS and CDS, 2011). Indeed, the complex lifecycle of zoonotic diseases, especially those involving multiple non-human animal species, entails the need of concerted actions at the different levels of the cycle to interrupt it in an effective manner. Similarly, in rabies control programmes, the management of roaming dogs is often a neglected area or is poorly coordinated with the overall control strategy (Direction de l'Epidemiologie et de Lutte contre les Maladies, 2018).

The classification of stakeholders according to their political and socio-technical agencies revealed a generally high agency of some internal stakeholders from the animal health sector (ONSSA). The agency of internal stakeholders from the public health sector was limited by the low priority they ascribed to the NHCP. Finally, internal stakeholders from local authorities and the Ministry of the Interior, who are responsible for the maintenance of infrastructures and the local enforcement of

the programme, displayed an even lower agency, despite their influence and power, due to the weak importance and priority they ascribed to the NHCP. Besides impairing their own effectiveness as internal stakeholders, this affected also their ability to elicit the participation of external stakeholders (Bouhafs and Ozcaglar-Toulouse, 2018). Important dynamic effects of stakeholders' engagement might be expected from a better congruence of the central actors in the programme implementation (Morsing and Schultz, 2006). This might contribute to reduce a second important defect identified here, namely the neglect of actors with important interests in the NHCP. To create this congruence, a better alignment is needed between the stakeholder's power or influence and the NHCP priority or importance for that stakeholder. Particularly, stakeholders with high power or high influence, but who ascribe a low priority or importance to CE control, can slow down NHCP implementation. The neglect by stakeholders may lead them to passivity in the control programme, or even to hinder its implementation. Mayers proposed a general strategy for managing relationships to mitigate the impact of such stakeholders and to guarantee the interests of neglected stakeholders (Mayers, 2005). Therefore, the sustainable improvement of a programme requires some changes in the power relationships among its actors. However, this is not easy to put in place because each change of power leads to a new equilibrium that depends on the possible development of technical, economic and social relationships (Crozier, 1960).

A possible strategy to improve the stakeholders' involvement could be the constitution of a multi-stakeholders' working group that must take into account the interests, position and specific needs of each stakeholder, and that will obtain their active support by increasing their power and leadership (Schmeer, 2000). Besides the multi-stakeholder group, regrouping stakeholders who share the same fields of action will allow sharing knowledge and experiences, thus promoting the multi-stakeholder group's work. Intersectoral collaboration is needed to improve the control of zoonoses (Marcotty et al., 2013). Collaboration among stakeholders could be promoted and managed by a central office that includes representatives of the different structures. This organization can meet the technical, coordination and communication needs.

The participatory approach followed in this study made it possible to visualize the process of CE control through its stakeholders' viewpoints. Table 3 summarizes the NHCP weaknesses revealed by this study, and the proposals generated from the results for improving it.

**Table 3.** Weak points of the current NHCP and proposals for improving them.

Weak points of the current NHCP	How to improve them
Not all stakeholders were identified by the NHCP	Include all stakeholders identified in this study in the new policy and action strategies
Stakeholders identified belong to different spheres (public health, animal health, private sector, politicians ...)	Manage the stakeholders' diversity by creating arenas of concertation. Understand each stakeholder's goals and interest in the NHCP, highlight the added value of collaboration for each of them.
Some CE control measures are neglected by stakeholders	Revise the incentives for stakeholders who fulfil their duty. Take into account their priorities.
NHCP is not a priority for key stakeholders with high power and influence	
The management of all stakeholders is difficult due to their high number and variety (different ministries and structures)	Create working groups of stakeholders who belong to similar spheres. Each working group will focus on one or more aspects/measures of CE control. Create a multi-stakeholder group that should benefit from the output of these working groups.
NHCP central management is difficult because the power/influence balance is different among stakeholders	Creation of a central office where each stakeholder has a representative. A stakeholder with high interest, high priority, high power and high involvement would be a good candidate to manage this central office.

## 5. Conclusion

This study provides an operational understanding of the stakeholders' role and potential in CE control in Morocco and identified stakeholders from different spheres (political, economic and social) who were neglected during the planning and implementation of the current NHCP. This study illustrates the complexity of controlling a zoonosis that results in part from the need to involve many different actors, well beyond the public and animal health sectors. Useful actors may be neglected or interactions between the actors involved may be impaired due to their different priorities or power relationships. Therefore, an ill-functioning collaboration cannot produce the needed field outcomes. Proposals were generated during this study to improve the NHCP, including working groups. This study proposes a structured analysis strategy to understand these interactions and inform their improvement. As a tool for evaluation and situation analysis, it may inform practical decision-making for zoonosis control. Applied in a systematic way in a diversity of settings, this methodology could generate cross-case studies and help to develop international recommendations to control zoonoses according to the One Health concept.



## **FUNDING INFORMATION**

This study received funding from the Academy of Research and Higher Education (ARES) of Belgium and University of Namur, Belgium, and Institute of Agronomic and Veterinary Hassan II, Rabat Morocco.

## **ACKNOWLEDGEMENTS**

We thank the Department of Epidemiology and Diseases Control (DELM), the National Office for Food Safety (ONSSA), the Provincial Health Delegation, and the Local Authorities. The authors are also grateful to Ides BOON who carried out the preliminary stages of this stakeholder analysis within the framework agreement between the Institute of Tropical Medicine, Antwerp, and the Belgian international cooperation.

## **APPENDIX A. SUPPLEMENTARY DATA**

Supplementary material related to this article can be found, in the online version, at [doi:https://doi.org/10.1016/j.prevetmed.2020.105227](https://doi.org/10.1016/j.prevetmed.2020.105227).

## References

Amarir, F.E., Saadi, A., Marcotty, T., Rhalem, A., Oukessou, M., Sahibi, H., et al., 2020. Cystic echinococcosis in three locations in the Middle Atlas, Morocco : estimation of the infection rate in the Dog Reservoir. *Vector Borne Zoonotic Dis.* 1-8. <https://doi.org/10.1089/vbz.2019.2538> [Internet] Available from:

Azzouzi, A.I., 2009. *Les Maladies Tropicales Negligees » au Maroc Contribution a l'elaboration d'une approche integree de lutte.*

Bonnafous-Boucher, M., Pesqueux, Y., 2006. In: Decouverte, L. (Ed.), *Decider avec les parties prenantes*, p. 268. Paris [Internet] Available from: <https://www.cairn.info/decider-avec-les-parties-prenantes-9782707147844.htm>.

Bouhafs, Ilana, Ozcaglar-Toulouse, N., 2018. *Influence Des Interactions Entre Parties Prenantes Internes (Top Management, Managers Et Employes) Sur L'Implementation Du Sustainable Supply Chain Management (Sscm)*, pp. 1-17.

Bryson, J.M., 2004. What to do when stakeholders matter. *Public Manag Rev.* 6 (1), 21-53.

Chebli, H., Laamrani El Idrissi, A., Benazzouz, M., Lmimouni, B.E., Nhammi, H., Elabandouni, M., et al., 2017. Human cystic echinococcosis in Morocco: Ultrasound screening in the Mid Atlas through an Italian-Moroccan partnership. *PLoS Negl. Trop. Dis.* 11 (3), 1-20.

Comite interministeriel de lutte contre L'Hydatidose, 2007. In: Idrissi AL, El, Lhor, Y., Roudani, M. (Eds.), *Lutte contre l'hydatidose/echinococose Guide des activites de lutte.* Rabat.

Crozier, M., 1960. Les relations de pouvoir dans un systeme d'organisation bureaucratique. *Sociol. Trav.* 2 (1), 61-75.

Culyer, A., 2005. Involving stakeholders in healthcare decisions - the experience of the national institute for health and clinical excellence (NICE) in England and Wales.

*Healthc. Q.* 8 (3), 56-60 [Internet] Available from: <http://www.longwoods.com/content/17155>.

Department for International Development, 2003. In: Jones, S. (Ed.), *Tools for Development, A Handbook for Those Engaged in Development Activity. The Round Table* [Internet] Available from: <http://webarchive.nationalarchives.gov.uk/+http://www.dfid.gov.uk/Documents/publications/toolsfordevelopment.pdf>.

Direction de l'Epidémiologie et de Lutte contre les Maladies, 2018. In: Ministère de la Sante (Ed.), *Programme national de lutte contre la rage la rage dans le monde. Journee mondiale de la rage.*

El Berbri, I., Petavy, A.F., Umhang, G., Bouslikhane, M., Fassi, F.O., Boue, F., et al., 2015. Epidemiological investigations on cystic echinococcosis in North-West (Sidi Kacem Province) Morocco: infection in ruminants. *Adv. Epidemiol.* 2015 <https://doi.org/10.1155/2015/104025> [Internet] Available from:

Federation internationale des Societes de la Croix-Rouge et du Croissant-Rouge, 2011. *Guide pour le suivi et l'evaluation de projets / programmes.* Genève, p. 160.

Lewis, L.K., Hamel, S.A., Richardson, B.K., 2001. Communicating change to nonprofit stakeholders: models and predictors of implementers' approaches. *Manag Commun Q* 15 (1), 5-41. <https://doi.org/10.1177/0893318901151001> [Internet] Available from: Lincoln, Y.S., Guba, E., 1985. In: Publications S (Ed.), *Naturalistic Inquiry*. Newbury Park.

Mansouri, B.E.L., Laboudi, M., Sadak, A., Rhajaoui, M., 2015. L'hydatidose humaine dans la region de Rabat (Maroc) : Etude de prevalence et apport du diagnostic serologique. *Int J Innov Sci Res*. 14 (2), 252-258 [Internet] Available from: <http://www.ijisr.issr-journals.org/>.

Marcotty, T., Thys, E., Conrad, P., Godfroid, J., Craig, P., Zinsstag, J., et al., 2013. Intersectoral collaboration between the medical and veterinary professions in low- resource societies: the role of research and training institutions. *Comp. Immunol. Microbiol. Infect. Dis*. 36 (3), 233-239. <https://doi.org/10.1016Zj.cimid.2012.10.009> [Internet]. Available from:

Mayers, J., 2005. *Analyse du pouvoir des parties prenantes*. International Institute for Environment and Development, London [Internet] Available from: International Institute for Environment and Development.

Morsing, M., Schultz, M., 2006. Corporate social responsibility communication : stakeholder information, response and involvement strategies. *Bus Ethics A Eur Rev*. 15 (4), 323-338.

Norwegian National Research Ethics Committees, 2016. *Guidelines for Research Ethics in the Social Sciences, Humanities, Law and Theology* [Internet] Available from:; p. 44 [www.etikkom.no](http://www.etikkom.no).

OMS, CDS, 2011. *Guide technique pour la surveillance integree de la maladie et la riposte dans la region africaine*, 2eme editi. OMS, Centers for Disease Control and Prevention, Brazzaville and Atlanta.

OMS. Echinococcose [Internet]. 2020. Available from: <https://www.who.int/fr/news-room/fact-sheets/detail/echinococcosis>.

OMS/OIE, 2002. In: Eckert, J., Gemmell, M.A., Meslin, F.-X., Pawlowski, Z.S. (Eds.), *Manual on Echinococcosis in Humans and Animals: A Public Health Problem of Global Concern*, Vol. 104. *Veterinary Parasitology*, Paris, p. 357.

Patton, M.Q., 1990. *Qualitative Evaluation and Research Methods*, 2nd edn. Sage Publi, London.

Saadi A., Amarir F., Filali H., Thys S., Rhalem A., Kirschvink N., et al. The socio-economic burden of cystic echinococcosis in Morocco: A combination of estimation method. Torgerson PR, editor. *PLoS Negl Trop Dis* [Internet]. 2020 Jul 31 [cited 2020 Aug 6]; 14(7):e0008410. Available from: <https://dx.plos.org/10.1371/journal.pntd.0008410>.

Schlange, L.E., 2006. Stakeholder identification in sustainability entrepreneurship. *Greener Manag Int*. 55, 13-32.

Schmeer, K., 2000. Stakeholder Analysis Guidelines, Vol. 15, pp. 338-345 [Internet] Available from: <http://heapol.oxfordjournals.org/cgi/content/abstract/15/3/338>.

Sedereviciute, K., Valentini, C., 2011. Towards a more holistic stakeholder analysis approach. Mapping known and undiscovered stakeholders from social media. *Int. J. Strateg. Commun*. 5 (4),

221-239 [Internet] Available from: 10.1080/  
1553118X.2011.592170%5Cnhttp://search.ebscohost.com/login.aspx?direct=true&db=ufh&AN=663  
56805&site=eds-live.

Sifer, K., Sulek, D., Mayer, M., 2011. Using Policy Mapping and Analytics to Understand Complex Policy Environments and Improve Decision-Making.

Thompson, R.C.A., McManus, D.P., 2002. Towards a taxonomic revision of the genus *Echinococcus*. *TRENDSin Parasitol.* 18 (10), 452-457.

Zott, C., Huy, Q.N., 2007. How entrepreneurs use symbolic management to acquire resources. *Adm. Sci. Q.* 52 (1), 70-105. <https://doi.org/10.2189/asqu.52.1.70> [Internet] Available from: