



# 14th IC BEN Congress on Noise as a Public Health Problem



## Noise pollution policies in the Arab world: an overview and comparison with European Union legislation

Dietrich Schwela<sup>1</sup>, Tallal Abdel Karim Bouzir<sup>2</sup>, Djihed Berkouk<sup>3</sup>, Maria Lahlouh<sup>4</sup>

<sup>1</sup>University of York, Environment Department, Stockholm Environment Institute (SEI), York, UK

<sup>2</sup>Institute of Architecture and Urban Planning, Blida University, Blida 09000, Algeria

<sup>3</sup>Department of Architecture, Biskra University, Biskra 07000, Algeria

<sup>4</sup>BAU, architectural and urban planning office, Biskra 07000, Algeria

Corresponding author's e-mail address: [dietrich.schwela@york.ac.uk](mailto:dietrich.schwela@york.ac.uk)

### ABSTRACT

This paper aims to study the current legislation in the 22 countries of the Arab League regarding noise pollution and soundscape issues and to compare country laws, and in a second step with those of the European Union to identify the differences and similarities between these two groups of countries' regulations. The methodology of this study is based mainly on analytical and comparative approaches to process the information collected from 31 laws promulgated in 22 Arab countries. Information is primarily obtained through governmental websites of the various ministries and state institutions concerned with environmental laws, as well as through web searches, in Arabic, and in the second language of each country. This study shows that legislators in Arab countries consider to some extent environmental issues, including noise pollution. Laws and regulations on noise pollution have been developed in all Arab League member countries except Somalia. However, there are no guidelines on noise level estimation, except in Oman, Qatar, and Saudi Arabia. Furthermore, the governments of these countries have not developed any guidelines for noise mapping. Therefore, the legislation in these countries is considered as insufficient and weak, making it challenging to implement and enforce it. Soundscape issues have not been addressed in Arabic legislative texts. The comparative analysis indicates that most Arab laws do not comply with the international standards established by the European Union governments. This study suggests that the Arab laws need urgent revision, upgrading and updating, followed by strategies for action to meet the sustainable development goals.

Keywords: Noise pollution laws; Soundscape legislation; Noise Guidelines; Arab countries, European Union regulations.

## **INTRODUCTION**

With a total of 156.8 million inhabitants, the 22 countries of the League of Arab States [1] make up 5,8% of the world's population [2]. In addition, its urban percentage is 70.2%, higher than the average of the world of 56.2% [3]. In terms of comfort and public health problems, noise pollution is also seen as one of the most severe problems facing Arab countries, especially in the last few years [4-7]. On a global scale, the burden of disease from environmental noise pollution ranks as the second most dangerous type of environmental pollution for human health after air pollution [8]. Noise from road traffic is the most important cause of impacts on human health. A bibliometric analysis indicates that the public health effects of environmental noise are rarely considered in Arab countries [9]. Only few studies report annoyance and sleep disturbance from exposure to road traffic noise [6, 7, 10-13]. Arab governments have not published statistics on the serious effects of environmental noise on public health such as hypertension, cardiovascular diseases, hearing impairment, tinnitus, and mental health effects. Nor exist such studies by public environmental health associations and organizations, or by researchers in Arab countries. On the other hand, environmental noise effects on human health are well documented in the European Union and elsewhere [8, 14-16]

This report is a brief overview of the current state of environmental noise legislation in Arab countries, which is based on a review paper of Bouzir et al. entitled "A review of noise pollution policies in the Arab world" that has been submitted to Acoustics Australia for publication [17]. The objective of this paper is to describe Arab legislation in a concise way and compare it with Directives and Regulations of the European Union.

## **METHODOLOGY**

The methodology of the study of Bouzir et al. [17] is to collect and analyze the different laws related to noise pollution in the twenty-two Arab countries by searching the official and governmental websites of the different ministries and state institutions concerned with environmental laws, as well as to perform an extensive search on Google, in Arabic and the second language of each country (French, or English) using the algorithm ((Country) AND (noise pollution) OR (noise levels OR (noise exposure))). More details on the methodology can be found in reference [17].

## **LEGISLATION CONCERNING ENVIRONMENTAL NOISE IN ARAB COUNTRIES**

The challenge of noise exposure became apparent first in the mid-sixties of last century when Iraq promulgated a law to protect the population against excessive sound pressure levels from loudspeakers and to prohibit the use of loudspeakers without permission. The latter could be fined and even jailed. Only in the eighties Algeria and Tunisia followed suit, while in the nineties and after 2000 most countries started to promulgate legislation on noise mitigation and abatement. The evolution of Arab legislation relating to noise is shown in figure 1.

The legal texts of the 22 Arab countries concerning environmental noise pollution can be divided in five categories of noise integration:

- Environmental laws and/or decrees which contain articles on environmental noise
- Specific noise legislation
- Setting of permissible sound pressure levels
- Definition of environmental noise
- Consideration of impacts

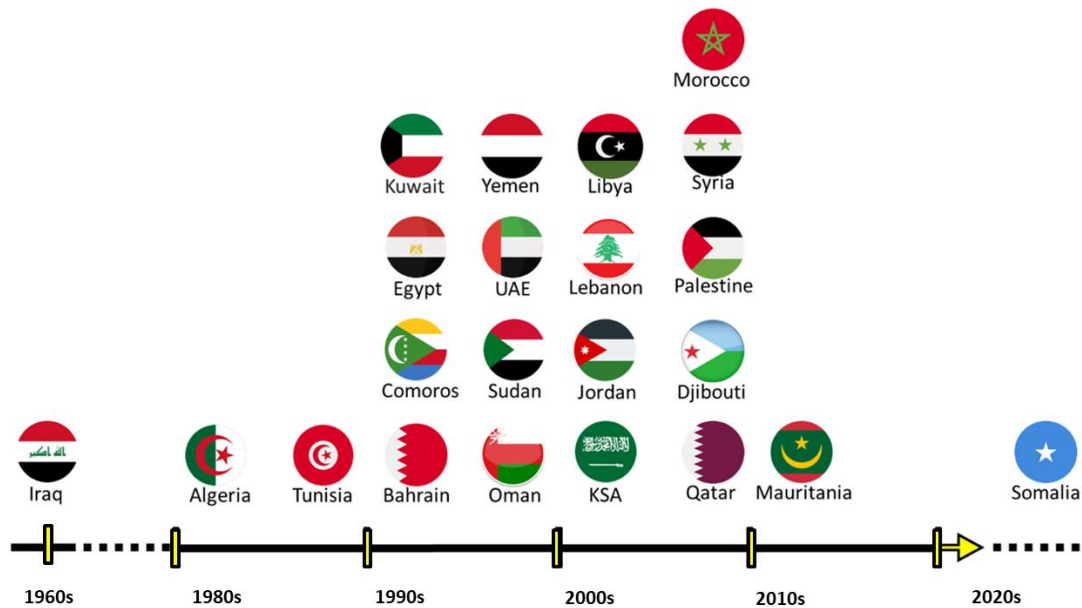


Figure 1. Time evolution of Arab legislation related to environmental pollution.

Table 1 shows the category – country relationships. The table demonstrates that 21 Arab League countries have promulgated environmental laws or decrees, with Somalia as the only country that has not promulgated a national environmental law. However, environmental legislation exists in the states of Puntland and Somaliland. In addition, Kurdistan Region – Iraq has also developed environmental legislation of its own as has the city of Tunis, Tunisia.

Nine Arab countries have developed legislation specific for noise: Algeria, Egypt, Iraq, Jordan, Morocco, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. Thus, a majority of 13 countries of the Arab League do not enjoy noise specific legislation. Somaliland and the city of Tunis have also promulgated specific noise legislation.

10 countries of the Arab League have set permissible noise limits either in the noise-specific legislation – Algeria, Egypt, Iraq, Jordan, Oman, Qatar, Saudi Arabia, United Arab Emirates – or in the environmental legislation – Syria, Tunisia. Unfortunately, Morocco although having promulgated a specific law for noise pollution has not set rigorous permissible noise limits [56]. While Kurdistan Region – Iraq and the city of Tunis have developed permissible noise limits in implementing their legislation, Somaliland does not seem to have set such limits despite the statements made in Articles 65 and 66 of Law No. 79/2018 [45].

The World Health Organization (WHO) has defined noise in its earliest publication of 1980 to be “any unwanted sound that may adversely affect the health and wellbeing of individuals or populations” [57]. Later WHO documents did not redefine the term [58]. However, often the definition “noise is unwanted sound” is quoted [59, 60]. This is also the case in the legislation of Iraq and Jordan, and the Kurdistan Region – Iraq, where noise is defined as “undesirable sounds”. No definition of noise is given in the legislation of 11 Arab League countries - Bahrain, Egypt, Kuwait, Lebanon, Morocco, Palestine, Saudi Arabia, Sudan, Syria, Tunisia, and Yemen – and the term “noise” is not mentioned in the environmental legislation of four Arab countries - Comoros, Libya, Mauritania, Somalia – and that of Somalia- Puntland. Algeria and Djibouti consider noise as a nuisance with potential impacts on health and the quality of life. This definition is equivalent of that of Somaliland where noise is defined as disturbing sound leading to annoyance as well as health effects and environmental impacts.

Table 1. Environmental legislation, noise legislation, limits, noise definition, impacts

Country	Environmental Law or Decree (Y/N)	Noise legislation (Y/N)	Permissible noise limits	Noise definition	Impact on	Reference
Algeria	Y	Y	Y	Nuisance. Impact (Art. 119, 120)	Health. Quality of life	[18, 19]
Bahrain	Y	N	N	None	Environmental pollution	[20]
Comoros	Y	N	N	Not mentioned	Quality of life	[21-23]
Djibouti	Y	N	N	Nuisance. Impact (Art. 74)	Health. Quality of life	[24, 25]
Egypt	Y	Y	Y	None	Health	[26]
Iraq	Y	Y	Y	Undesirable sounds	Health. Quality of life. Environment	[27]
Kurdistan Region - Iraq	Y	Y	Y	Undesirable sounds	Health. Quality of life. Animals	[28, 29]
Jordan	Y	Y	Y	Undesirable sounds	Health. Quality of life. Environment	[30, 31]
Kuwait	Y	N	N	None	Neighbouring environment including public health (Articles 1, 19, 54, 55, 164)	[32, 33].
Lebanon	Y	N	N	None	Environment	[34]
Libya	Y	N	N	Not mentioned	Environment	[35]
Mauritania	Y	N	N	Not mentioned	Health. Environment	[36]
Morocco	Y	Y	N	None	Discomfort. Health. Environment (Article 47)	[37]
Oman	Y	Y	Y	Public noise: Sounds of external sources. Impulse noise: Sounds of short period and high sound level	Nuisance. Quality of life	[38]

Country	Environmental Law or Decree (Y/N)	Noise legislation (Y/N)	Permissible noise limits	Noise definition	Impact on	Reference
Palestine	Y	N	N	None	All forms of life. Environmental nuisance (Article 25)	[39]
Qatar	Y	Y	Y	A sound in which frequency exceeds the allowed limits	Living beings. Surrounding air, etc.	[40, 41]
Saudi Arabia	Y	Y	Y	None	Health. Quality of life. Human welfare. Bio-organisms	[42, 43]
Somalia	N	N	N	-	-	
Somalia - Puntland	Y	N	N	Not mentioned	Health. Environment	[44]
Somalia - Somaliland	Y	Y	N	Disturbing sound	Annoyance. Health. Environment	[45]
Sudan	Y	N	N	None	Environment	[46]
Syria	Y	N	Y	None	Health. Environment	[47, 48]
Tunisia	Y	N	N	None	Health	[49-51]
Tunisia - Tunis	Y	Y	Y	None	Health	[52, 53]
United Arab Emirates	Y	Y	Y	Sounds, vibrations, or sound frequencies	Nuisance. Harm to public health	[54]
Yemen	Y	N	N	None	Deterioration of living creatures. Environmental pollution	[55]

Y = Yes; N = No; - Not applicable

In its legislation, Oman distinguishes between public noise, defined as sounds from external sources, and impulse noise as nuisance sounds of short periods and high sound levels. Qatar law defines noise as a 'sound in which frequency exceeds the allowed limits' without specifying what the allowed frequency limits are. Finally, the United Arab Emirate legislation defines noise as 'sounds, vibrations or sound frequencies potentially leading to nuisance and adverse public health effects. Some of these definitions appear to show a poor understanding of noise issues.

The impacts of noise mentioned in the legislations of most Arab countries include human health and quality of life. Some countries such as Bahrain, Iraq, Jordan, Lebanon, Morocco, Palestine, Sudan, and Yemen add an interesting aspect of impacts of noise on the environment, environmental pollution, environmental nuisance, and animals.

Arab countries that have set permissible noise limits (ten out of 22) also have defined zones associated with them without, however, mentioning the area selection criteria in a consistent way. Zones most often defined in the legislation are residential, mixed (commercial, administrative, residential with some small businesses), sensitive (schools, kindergartens, hospitals, educational facilities, urban protected areas, places of worship, quiet and natural spaces), and industrial zones. The number of zones varies among countries from two for Algeria to 11 for Iraq. Nine countries – Algeria, Egypt, Iraq, Jordan, Oman, Saudi Arabia, Syria, United Arab Emirates -, and the city of Tunis have set permissible sound pressure levels for residential areas. All of these, except Algeria, and Qatar have defined permissible levels for mixed areas, but only five countries – Algeria, Iraq, Jordan, Syria, and Tunis, consider sensitive areas. Sound pressure values for industrial areas have been promulgated by all countries except Algeria, Saudi Arabia and United Arab Emirates, and the city of Tunis.

Six Arab countries – Algeria, Iraq, Jordan, Qatar, Saudi Arabia, and United Arab Emirates have associated day and night periods with permissible sound pressure levels although beginnings and ends of daytime and night-time are set differently in the different countries. Two countries – Egypt, Syria – and the Kurdistan Region Iraq and Tunis have set day, evening, and night periods, and Oman distinguishes between workdays' day, evening, and night periods and periods on non-working days.

It is not surprising that the values of the permissible sound pressure levels for the nine different countries – Algeria, Egypt, Iraq, Jordan, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates – and the Kurdistan Region Iraq and the city of Tunis differ substantially among countries due to country-specific legislations. This is also true with respect to the different use of acoustic indicators for which six countries - Algeria, Iraq, Jordan, Qatar, Saudi Arabia, United Arab Emirates – and the city of Tunis use the equivalent  $L_{\text{day}}$  and  $L_{\text{night}}$  indicators, while Egypt, Kurdistan Region Iraq, Oman, and Syria assess the equivalent  $L_d$ ,  $L_e$ , and  $L_n$  indicators. In addition, Oman uses the  $L_{\text{den}}$  indicator for aviation operation noise.

Further inspection of Arab countries legislation, governmental websites, and sound pressure level assessments show:

- No noise maps have been developed until now.
- Only a few recent case studies have reported noise maps in small urban areas [13, 61-64].
- Environmental sound pressure levels are modeled or monitored and published in few countries such as Egypt, Saudi Arabia, and the United Arab Emirates [65-67].
- Some recent studies provide a rough idea of noise exposure in other countries [68-70].
- Official statistics on the effects of noise on public health are lacking.
- Only limited studies on sleep disturbance and annoyance due to traffic noise exposure exist [4, 71, 72].
- Actions plans for noise abatement are mostly lacking in Arab countries.
- Protocols for noise measurement procedures have only been mentioned in the legislation of six out of 22 Arab countries - Algeria, Egypt, Jordan, Oman, Saudi Arabia, and the United Arab Emirates -, but there is little evidence of their implementation except for Jordan and Oman, where the recommendations of ISO

2204:1979 (withdrawn!) and ISO 1996-1:2016 seem to be followed, respectively [73, 74].

In summary, legislation on environmental noise abatement in the 22 countries of the Arab League is unfinished work due to a poor understanding of noise issues, lack of essential ingredients of noise management such as noise modelling and monitoring, lack of standard operating procedures, lack of national noise standards in more than half of the countries, ignorance of the impacts of environmental noise on human health and wellbeing, absence of urban noise mapping, weak or absent noise action plans, and no understanding of soundscape ideas and methodology.

## COMPARISON OF THE SCOPES OF ARAB AND EUROPEAN UNION LEGISLATION

There are at least six scopes environmental noise regulations should cover: environmental noise laws, noise emissions from various sources – road traffic, railways interoperability, aircraft operations, construction activities, and industrial activities. Their management needs a framework environmental noise regulation. In Table 2, Arab legislation scopes are compared with those of European Union legislation.

Table 2. Comparison of Arab and European legislation

Scope of legislation	Arab countries	European Union	Reference
<b>Environmental noise law</b>	9/22	Directive 2002/49/EC	[75]
<b>Motor vehicles</b>	-	Regulation (EU) 540/2014	[76]
<b>Railways interoperability</b>	-	Directive 2004/50/EC	[77]
<b>Airport operations</b>	-	Regulation (EU) 598/2014 Directive 2006/93/EC	[78] [79]
<b>Construction equipment</b>	-	Directive 2005/88/EC Directive 2000/14/EC	[80] [81]
<b>Industrial activities</b>	-	Directive 2010/75/EU	[82]

In addition, the European Union passes Commission Decisions on noise issues [83].

Large differences also exist between Arab countries and the European Union with respect to guidance documents that facilitate the implementation and enforcement of environmental noise legislation. Only three Arab countries have published guidance on sound pressure measurement, abatement, and management: Oman [84], Qatar [41], and Saudi Arabia [85, 86]. In contrast, Directive 2002/49/EC [75] provides guidance on sound pressure measurement, standard operational procedures, and setting of noise limits by enforcing the guideline values the WHO guideline documents [8, 87, 88]. In addition, guidance documents on noise exposure and health impacts and on noise mapping have been published in the European Union [89, 90].

## CONCLUSION

The analysis for the noise legislation promulgated in the countries in the League of Arab States and the comparison with noise legislation in the European Union showed that legislation on environmental noise abatement in the 22 Arab countries of the Arab League is

incomplete and flawed. This is due to a poor understanding of noise issues, lack of essential ingredients of noise management such as noise modelling and monitoring, lack of standard operating procedures, and lack of national noise standards in more than half of the countries. In addition, impacts of environmental noise on human health and wellbeing are widely ignored. Urban noise mapping is absent in all countries, and noise action plans are non-existing. Moreover, ideas and methodology of soundscapes are completely ignored in the 22 Arab countries. As a matter of fact, environmental noise legislation, implementation, and enforcement in Arab League countries does not meet international standards.

The reason for the deficiencies in the Arab countries' legislation may partly be due to more pressing environmental challenges such as drought, desertification, and water scarcity, and to the instability of the political and economic situation in many Arab countries. In addition, a weak political will to lower the burden of disease for the population may also play a role.

To improve the environmental noise situation in Arab countries, governments are advised to review, update, and upgrade their laws and regulation, develop action plans for noise mitigation measures, and ensure their implementation and enforcement. In addition, the League of Arab States is invited to consider the development of a general Framework Law on Environmental Noise as well as regulations and guidance documents to minimize capacity and capability needs, and to help its Member States overcome the environmental noise challenge. The Environmental Noise Directive of the European Union could be used as a blueprint for this undertaking.

## REFERENCES

1. League of Arab States (LAS). <https://arab.org/directory/league-of-arab-states/>.
2. United Nations, Department of Economic and Social Affairs, Population Division: World Population Prospects. 2022 <https://population.un.org/wpp/Download/Standard/MostUsed/>.
3. United Nations: World Urbanization Prospects - Population Division. <https://population.un.org/wup/>
4. Bouzir TAK, Berkouk D, Boucherit S, et al. Evaluation of soundscape variations through the open public spaces in Saharan cities: A Case of Biskra, Algeria. *Environmental Research, Engineering and Management*. 78(4): 39–51. 2022. <https://doi.org/10.5755/j01.ere.m.78.4.31244>.
5. Al Harthy I, Ba Omar T. Investigation of noise pollution in the Sultan Qaboos University, Muscat. In: INTER-NOISE and NOISE-CON Congress and Conference Proceedings. pp. 70–80. Institute of Noise Control Engineering. 2019. Abstract: <https://www.ingentaconnect.com/contentone/ince/incecp/2019/00000259/00000009/art00027>.
6. Peplow A, Thomas J, AlShehhi A. Noise annoyance in the UAE: A Twitter case study via a data-mining approach. *Int J Environ Res Public Health* 18: 2198. 2021. <https://www.mdpi.com/1660-4601/18/4/2198>.
7. Schwela, D.: Environmental noise challenges and policies in low-and middle-income countries. *SFJH* 2(1): 26–45. 2021. <https://doi.org/10.46981/sfjhw2n1-003>.
8. Environmental noise guidelines for the European Region. Copenhagen: WHO Regional Office for Europe, World Health Organization. 2018. [https://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0008/383921/noise-guidelines-eng.pdf](https://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf).
9. Manohare M, Rajasekar E, Parida M, Vij S. Bibliometric analysis and review of auditory and non-auditory health impact due to road traffic noise exposure. *Noise Mapping* 9:67-88. 2022. <https://www.degruyter.com/document/doi/10.1515/noise-2022-0005/html>.
10. Elmehdi HM. Road traffic noise in major UAE cities: Levels and projects' health effects. *Current Politics and Economics of the Middle East* 8(2): 151-166. 2017.
11. Korfali SI, Massoud M. Assessment of community noise problem in Greater Beirut Area,



- Lebanon. Environmental monitoring and Assessment 84: 203-218. 2003.  
<https://link.springer.com/article/10.1023/A:1023322507415#citeas>.
12. Alkaabi KA. Studying the effects of aircraft noise around Abu Dhabi international airport, UAE, on the surrounding residential and workplaces. Civil Engineering and Urban Planning 4(2). June 2017.  
[https://d1wqtxts1xzle7.cloudfront.net/73868275/9cb666fc2c3d9e93621930aea489f2d878ba-libre.pdf?1635609984=&response-content-disposition=inline%3B+filename%3DStudying\\_the\\_Effects\\_of\\_Aircraft\\_Noise\\_A.pdf&Expires=1680973183&Signature=KYAX1UOO649O~H6BvZLsyIIOMtnJlkROKYG-7LQ2D1FgHukURt-dBYeSGpejedVafcjiG7bGaRE8eStGzftPChEqn7P1WYpA2q56ZrU7yWSrreJTylGhGxXS B5QNZck4rhzxYsoahutKrlw3jnCsxJb1RM9aSG2UztBfzn4qdx2ikWfrKylf8KY79ya3qRx OF38HhE3UHsCN-lf130xgFH2vKnYxWiidJW2JRnzT6-w1FMpytloA9U7kyArZsMx748D38~OGb9q5~rK3XGHK-g6aKwPCk41QSYEjiBNQEsxaMDP6DY6vCa5-SH9K2iF5RREaq-Q6CgBvLSV3XJaQ\\_\\_&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA](https://d1wqtxts1xzle7.cloudfront.net/73868275/9cb666fc2c3d9e93621930aea489f2d878ba-libre.pdf?1635609984=&response-content-disposition=inline%3B+filename%3DStudying_the_Effects_of_Aircraft_Noise_A.pdf&Expires=1680973183&Signature=KYAX1UOO649O~H6BvZLsyIIOMtnJlkROKYG-7LQ2D1FgHukURt-dBYeSGpejedVafcjiG7bGaRE8eStGzftPChEqn7P1WYpA2q56ZrU7yWSrreJTylGhGxXS B5QNZck4rhzxYsoahutKrlw3jnCsxJb1RM9aSG2UztBfzn4qdx2ikWfrKylf8KY79ya3qRx OF38HhE3UHsCN-lf130xgFH2vKnYxWiidJW2JRnzT6-w1FMpytloA9U7kyArZsMx748D38~OGb9q5~rK3XGHK-g6aKwPCk41QSYEjiBNQEsxaMDP6DY6vCa5-SH9K2iF5RREaq-Q6CgBvLSV3XJaQ__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA)
  13. Abdur-Rouf K, Shaaban K. Measuring, mapping, and evaluating daytime traffic noise levels at urban road intersections in Doha, Qatar. Future Transp. 2(3): 625-643. 2022.  
<https://www.mdpi.com/2673-7590/2/3/34>.
  14. Schwela D. Review of environmental noise policies and economics in 2014-2016. SFJH 2: 46-61. 2021. <https://ojs.southfloridapublishing.com/ojs/index.php/jhea/article/view/86>.
  15. Schwela D. Review of environmental noise policies and actions in 2017-2021. SFJH 3(4): 329-352. 2022.  
<https://ojs.southfloridapublishing.com/ojs/index.php/jhea/article/view/1875/1468>.
  16. Luzzi S, Natale R, Carfagni M, Borchi F, Bartalucci C. Environmental Noise Directive implementation: State of art, public participation, and noise awareness. Noise Theory and Practice. 2, 2–15. 2016.  
[https://www.academia.edu/67494363/Environmental\\_noise\\_Directive\\_implementation\\_state\\_of\\_art\\_public\\_participation\\_and\\_noise\\_awareness](https://www.academia.edu/67494363/Environmental_noise_Directive_implementation_state_of_art_public_participation_and_noise_awareness).
  17. Bouzir TAK, Berkouk D, Schwela D, Lahlouh M. A review of noise pollution in the Arab world. Submitted to Acoustics Australia. 2023.
  18. Algeria Law: Loi n° 83-03 du 5 février 1983 relative à la protection de l'environnement. 1983. In French.  
[http://www.vertic.org/media/National%20Legislation/Algeria/DZ\\_Loi\\_Protection\\_Environnement.pdf](http://www.vertic.org/media/National%20Legislation/Algeria/DZ_Loi_Protection_Environnement.pdf).
  19. Algeria Decree: Executive decree no 93-184 of 27th July regulating sound emission. 1993. [https://www.energy.gov.dz/Media/galerie/decret\\_executif\\_93-184\\_5b6862e1470c1.pdf](https://www.energy.gov.dz/Media/galerie/decret_executif_93-184_5b6862e1470c1.pdf).
  20. Bahrain Decree: Legislative Decree No. 21 of 1996 on the Environment. 1996.  
<https://s3.amazonaws.com/rgi-documents/54824f0a8c2002b0a91d6ea7993f1996b6436d43.pdf>. In Arabic:  
<https://faolex.fao.org/docs/pdf/bah8853.pdf>.
  21. Comoros Law: Loi-cadre n° 94-018 relative à l'environnement. In French. 1994.  
<https://faolex.fao.org/docs/pdf/com11718.pdf>.
  22. Comoros Law: Loi n°95-007 du 19 juin 1995 portant modification de certaines dispositions de la loi n°94-018/AF du 22 juin 1994 relative à l'Environnement. In French. 1995. <https://faolex.fao.org/docs/pdf/com167443.pdf>.
  23. Comoros Law: Loi n° 95-009/AF portant création, organisation et fonctionnement de l'Institut National de Recherche pour l'Agriculture, la Pêche et l'Environnement (INRAPE). In French. 1995. <https://leap.unep.org/countries/km/national-legislation/loi-ndeg-95-009af-portant-creation-organisation-et-fonctionnement>.
  24. Djibouti Law: Loi n°51/AN/09/6ème L du 1 Juillet 2009 portant Code de l'Environnement. In French. 2009. <https://faolex.fao.org/docs/pdf/dji92357.pdf>.
  25. Djibouti Law: Loi n°106/AN/00/4ème L portant sur le Cadre de l'Environnement. In French. 2000.

- [https://www.vertic.org/media/National%20Legislation/Djibouti/DJ\\_Loi\\_Cadre\\_Environnement.pdf](https://www.vertic.org/media/National%20Legislation/Djibouti/DJ_Loi_Cadre_Environnement.pdf).
26. Egypt Law: Law number 4 of 1994 promulgating the Environment Law, amended by law no. 9 for 2009. 1994. <https://faolex.fao.org/docs/pdf/egy4984E.pdf>.
  27. Iraq Law: Law No. 41 of 2015 on Noise Protection and Control. 2015. [https://www.ilo.org/dyn/natlex/natlex4.detail?p\\_isn=102971&p\\_lang=en](https://www.ilo.org/dyn/natlex/natlex4.detail?p_isn=102971&p_lang=en). In Arabic: <https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/102971/124735/F430318119/4390.pdf>.
  28. Kurdistan Region – Iraq Law: Law No.8 of 2008 Environmental Protection and Improvement in Kurdistan Region – Iraq. 2008. <https://faolex.fao.org/docs/pdf/irq147108E.pdf>. In Arabic: <https://faolex.fao.org/docs/pdf/irq147108.pdf>.
  29. Salih SA, Ali A. Environmental legislation guides in Kurdistan Region - Iraq. First Version, Sulaimaniya 2015. <http://www.natureiraq.org/uploads/5/2/9/9/52997379/english.pdf>.
  30. Jordan Law: Environmental Protection Law No. 6 of 2017. <https://www.unhcr.org/jo/wp-content/uploads/sites/60/2020/06/Annex-A1-Environmental-Law-English-Version.pdf>. In Arabic: <https://faolex.fao.org/docs/pdf/jor173241.pdf>.
  31. Jordan Instruction: Instruction of 2003 on the control and protection against noise. <https://www.fao.org/faolex/results/details/en/c/LEX-FAOC070941/>. In Arabic: 2003. <https://faolex.fao.org/docs/pdf/jor70941.pdf>.
  32. Kuwait Law: Environment Protection Law No. 42 of 2014 with its modification by law no. 99 of 2015. <https://kdipa.gov.kw/wp-content/uploads/2022/08/Law-No.-42-of-2014-regarding-Environment-protection.pdf>.
  33. Mohamed A. Executive regulations of the Environmental Protection Law No. 42 of 2014 and its amendments No. 99 of 2015. In Arabic. 2015. <https://almirjah.wordpress.com/2020/07/23/422014992015/>.
  34. Lebanon Law: Law No.444 of 2002 on environmental protection. In Arabic. 2002. <https://www.fao.org/faolex/results/details/es/c/LEX-FAOC037678/>.
  35. Libya Law: Law No. 15 of 2003 on the protection and improvement of the environment. 2003. <https://www.ecolex.org/details/legislation/law-no-15-of-2003-on-the-protection-and-improvement-of-the-environment-lex-faoc045081/>.
  36. Mauritania Law: Loi n° 2018-002 relative à la lutte contre la pollution de l'air. In French. 2018. [http://www.environnement.gov.mr/fr/images/reglementations/Loi\\_pollution\\_Air\\_FR.pdf](http://www.environnement.gov.mr/fr/images/reglementations/Loi_pollution_Air_FR.pdf).
  37. Morocco Law: Law No. 11-03 pertaining to the protection and improvement of the environment. 2003. <https://www.informea.org/en/law-no-11-03-pertaining-protection-and-improvement-environment>.
  38. Oman Decision: Ministerial Decision No. 79/94 dated 20 March 1994 issuing regulations for noise pollution control in the public environment. Ministry of Regional Municipalities, Environment & Water Resources. 1994. <https://www.pdo.co.om/hseforcontractors/LegalRequirements/MD%2079-94-Noise%20Pollution%20Control%20In%20Public%20Environment.pdf>.
  39. Palestine Law: Project Law No. 7 of 1999 on the environment. 1999. <https://leap.unep.org/countries/national-legislation/project-law-no-7-1999-environment>.
  40. Qatar Law: Law No. 30, of 2002 of the Environment Protection. 2002. <https://www.almeezan.qa/LawPage.aspx?id=4114&language=en>.
  41. Health, safety & environment technical guideline. TG-08. Noise management. Qatar University. Undated. [https://www.qu.edu.qa/static\\_file/qu/offices%20and%20departments/Campus%20Facilities%20and%20General%20Services/documents/QU%20HSEMS%20Technical%20Guidelines/8-TG-08\\_Noise\\_Management\\_\\_Vers\\_1.1\\_.pdf](https://www.qu.edu.qa/static_file/qu/offices%20and%20departments/Campus%20Facilities%20and%20General%20Services/documents/QU%20HSEMS%20Technical%20Guidelines/8-TG-08_Noise_Management__Vers_1.1_.pdf).
  42. Saudi Arabia Regulation: General environmental regulations and rules for implementation, 15 October 2001. Presidency of Meteorology and Environment. 2001. <https://elaw.org/system/files/attachments/publicresource/saudiArabia.General%20Environmental%20Regulations.pdf>.

43. Saudi Arabia Decree: Royal Decree No.M/165 of 10 July 2020. Appendix 1: Environmental Protection Standards. In Arabic. 2020.  
<https://istitlaa.ncc.gov.sa/ar/civil/mewa/clutter/Documents/%D9%85%D8%B4%D8%B1%D9%88%D8%B9%20%D8%A7%D9%84%D9%84%D8%A7%D8%A6%D8%AD%D8%A9%20%D8%A7%D9%84%D8%AA%D9%86%D9%81%D9%8A%D8%B0%D9%8A%D8%A9%20%D9%84%D9%84%D8%B6%D9%88%D8%B6%D8%A7%D8%A1%20%D9%84%D9%86%D8%B8%D8%A7%D9%85%20%D8%A7%D9%84%D8%A8%D9%8A%D8%A6%D8%A9.pdf>.
44. Somalia – Puntland Act: Environmental Impact Assessment Act. Final draft. January 2015. <https://www.eia.nl/documenten/00000440.pdf>.
45. Somalia – Somaliland Law: Somaliland Environmental Management Law No. 79/2018. Contents in Somali and English: 2018.  
<https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/108742/134583/F768772729/SOM108742.pdf>. Full text in Somali:  
[http://www.somalilandlaw.com/xeerka\\_Maareynta\\_deegaanka\\_2018.pdf](http://www.somalilandlaw.com/xeerka_Maareynta_deegaanka_2018.pdf).
46. Sudan Law: Environmental Protection Law of 23 June 2001.  
<https://faolex.fao.org/docs/pdf/sud68174E.pdf>. In Arabic: 2001.  
<https://s3.amazonaws.com/rgi-documents/919bf76b9c80a9869dfd6109d98e0607fb231ece.pdf>.
47. Syria Law: Law No. 12 of 2012 setting the necessary basic rules for the safety and protection of the environment. In Arabic: 2012.  
[https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/93210/108892/F-457653414/law no. 12 of 2012 syria SYR-2012-L-93210.pdf](https://www.ilo.org/dyn/natlex/docs/ELECTRONIC/93210/108892/F-457653414/law%20no.%2012%20of%202012%20syria%20SYR-2012-L-93210.pdf).
48. Hadba L. Noise mapping for an urban area. Study case: Old City of Damascus, Syria. 2015. Universidade do Minho. Escola de Engenharia.  
<https://repositorium.sdum.uminho.pt/handle/1822/41497?mode=full>.
49. Tunisia Decree: Décret n° 84-1556 du 29 décembre 1984, portant réglementation des lotissements industriels. In French. 1984.  
[http://www.citet.nat.tn/Portail/doc/SYRACUSE/40992/decret-n-84-1556-du-29-decembre-1984-decret-n-84-1556-du-29-decembre-1984-portant-reglementation-des?\\_lg=fr-FR](http://www.citet.nat.tn/Portail/doc/SYRACUSE/40992/decret-n-84-1556-du-29-decembre-1984-decret-n-84-1556-du-29-decembre-1984-portant-reglementation-des?_lg=fr-FR).
50. Tunisia Decree: Décret n° 2010-262 du 15 février 2010, fixant la liste des contraventions aux dispositions du code de la route et à ses textes d'application. In French. 2010.  
<https://www.jurisitetunisie.com/tunisie/codes/cr/D2010-0262.htm>.
51. Tunisia Decree: Décret n° 2000-147 du 24 janvier 2000, fixant les règles techniques d'équipement et d'aménagement des véhicules. In French. 2000.  
[http://www.citet.nat.tn/Portail/doc/SYRACUSE/40549/decret-n-2000-147-du-24-janvier-2000-decret-n-2000-147-du-24-janvier-2000-fixant-les-regles-techniqu?\\_lg=fr-FR](http://www.citet.nat.tn/Portail/doc/SYRACUSE/40549/decret-n-2000-147-du-24-janvier-2000-decret-n-2000-147-du-24-janvier-2000-fixant-les-regles-techniqu?_lg=fr-FR).
52. Tunis – Tunisia Decision: *Arrêté* du *président* de la municipalité *Maire de Tunis* du 22/08/2000 aux valeurs limites réglementaires relatives au bruit. In French. 2000.  
<http://www.collectiviteslocales.gov.tn/wp-content/uploads/2017/06/PGES-Essalem-Ennour-ZRIBA.pdf>.
53. Plan de gestion environnementale et sociale. Programme de Développement Urbain et de la Gouvernance Locale. Sous-programme 1: Fourniture d'infrastructures municipales. April 2018. Ministry of Local Affairs and Environment, Governorate of Kebili, Jemna Community. 2018.  
<http://www.cpscl.com.tn/upload/telechargement/telechargement522.pdf>.
54. United Arab Emirates Law: Federal Law No. 24 of 1999 for the protection and development of the environment, as amended by Federal Law No. 11 of 2006. In English, without Annexes:  
[https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiEv77\\_i5j-AhW5Q\\_EDHTveD6AQFnoECAsQAQ&url=https%3A%2F%2Fwww.dewa.gov.ae%2F%2Fmedia%2FFiles%2FAbout-DEWA%2FLegislations%2FEnglish%2FFederal-Law-No24-of-1999-on-Enviroment-Protection.ashx&usg=AOvVaw3mWMXHtLNzZe7FpMIZMv\\_8](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwiEv77_i5j-AhW5Q_EDHTveD6AQFnoECAsQAQ&url=https%3A%2F%2Fwww.dewa.gov.ae%2F%2Fmedia%2FFiles%2FAbout-DEWA%2FLegislations%2FEnglish%2FFederal-Law-No24-of-1999-on-Enviroment-Protection.ashx&usg=AOvVaw3mWMXHtLNzZe7FpMIZMv_8). In Arabic:

- [https://drive.google.com/file/d/1KfJQG0\\_FF7CfU\\_\\_DVAJ0gsiibC2TNoTn/view](https://drive.google.com/file/d/1KfJQG0_FF7CfU__DVAJ0gsiibC2TNoTn/view).
55. Yemen Law: Environment Protection Law No. 26 of 1995. Republic of Yemen. 1995. <http://www.bcrc-egypt.com/docs/yemen-26-11.pdf>.
  56. Abacouss O. Pollution sonore au Maroc: Le remue-ménage sourd d'un bruit qui court toujours. L'Opinion 28 December 2021. [https://www.lopinion.ma/Pollution-sonore-au-Maroc-Le-remue-menage-sourd-d-un-bruit-qui-court-toujours\\_a22295.html](https://www.lopinion.ma/Pollution-sonore-au-Maroc-Le-remue-menage-sourd-d-un-bruit-qui-court-toujours_a22295.html).
  57. Noise. Environmental Health Criteria Document No. 12. Geneva: World Health Organization. International Programme on Chemical Safety. In conjunction with the United Nations Environmental Programme. <https://apps.who.int/iris/bitstream/handle/10665/39458/9241540729-eng.pdf>.
  58. Schwela D. The WHO guidelines for environmental noise. Immissionsschutz 01.23: 32-41. [https://www.academia.edu/100100605/The\\_WHO\\_guidelines\\_for\\_environmental\\_noise](https://www.academia.edu/100100605/The_WHO_guidelines_for_environmental_noise).
  59. Basner M, Clark C, Hansell A, et al. Aviation noise impacts: State of the science. *Noise & Health* 19(87): 41-50. 2017. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5437751/>.
  60. Fink D. A new definition of noise: noise is unwanted and/or harmful sound. Noise is the new 'secondhand smoke'. Acoustical Society of America. 178th Meeting, San Diego, CA. 2-6 December 2019. <https://asa.scitation.org/doi/pdf/10.1121/2.0001186>.
  61. Mofeed B, Imam R, Jamrah A: Noise mapping using GIS: A Case study from Amman. *Journal of American Science*. 9(12): 646–652. 2013. [https://www.researchgate.net/publication/272483940\\_Noise\\_Mapping\\_using\\_GIS\\_A\\_Case\\_Study\\_from\\_Amman](https://www.researchgate.net/publication/272483940_Noise_Mapping_using_GIS_A_Case_Study_from_Amman).
  62. Abdmouleh MA, Dahech S: Cartographie de la pollution sonore dans l'agglomération de Sfax. In: XXXIIIème Colloque de l'Association Internationale de Climatologie. 2020. <https://hal.science/hal-02963553/document>.
  63. Al-Kandary DS, Al-Awadhi JM: Mapping Traffic Noise in Kuwait City. *Journal of the Gulf & Arabian Peninsula Studies* 48(184): 13-38. 2022. Abstract: <https://web.p.ebscohost.com/abstract?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=02544288&AN=157448000&h=Z%2bPM9K%2bOgLoVhTCbUPX1COEvC9Y4puHLokmPRb0Op8vK60Fm8HI16XneSzF88CMZ%2fxIRLN8x0xZjQKRJjrg8qQ%3d%3d&crl=c&resultNs=AdminWebAuth&resultLocal=ErrCriNotAuth&crlhashurl=login.aspx%3fdirect%3dtrue%26profile%3dehost%26scope%3dsite%26authtype%3dcrawler%26jrnl%3d02544288%26AN%3d157448000>.
  64. Bouzir TAK, Zemmouri N: Effect of urban morphology on road noise distribution. *Energy Procedia* 119: 376–385. 2017. <https://doi.org/10.1016/j.egypro.2017.07.121>.
  65. Egypt completes first noise monitoring station. *Nature News* August 3, 2021. <https://naturenews.africa/egypt-completes-first-noise-monitoring-station/>.
  66. Zytoon MA. Opportunities for environmental noise mapping in Saudi Arabia: A case of traffic noise annoyance in an urban area in Jeddah City. *Int. J. Environ. Res. Public Health* 13(5): 496. 2016. <https://www.mdpi.com/1660-4601/13/5/496>.
  67. Ten stations in Dubai to measure noise levels. *Gulf News*, May 25, 2016. <https://gulfnews.com/uae/government/ten-stations-in-dubai-to-measure-noise-levels-1.1834672>.
  68. Bouzir TAK, Zemmouri N. Evaluation of the sound environment of the city of Biskra (Algeria). *J. Appl. Eng. Science & Technology* 4: 7–11. 2018. [https://www.researchgate.net/publication/325552851\\_Evaluation\\_of\\_the\\_sound\\_environment\\_of\\_the\\_city\\_of\\_Biskra\\_Algeria](https://www.researchgate.net/publication/325552851_Evaluation_of_the_sound_environment_of_the_city_of_Biskra_Algeria).
  69. Shammas MI. Environmental monitoring and assessment: a case in Salalah, Oman. *Environ Monit Assess* 193: 700. 2021. [https://www.researchgate.net/publication/355143441\\_Environmental\\_monitoring\\_and\\_assessment\\_a\\_case\\_in\\_Salalah\\_Oman](https://www.researchgate.net/publication/355143441_Environmental_monitoring_and_assessment_a_case_in_Salalah_Oman).
  70. Ohiduzzaman M, Sirin O, Kassem E. Evaluation of traffic noise in the State of Qatar. In: *Advances in Materials and Pavement Performance Prediction*. pp. 249–253. CRC Press. 2018. Abstract: <https://www.taylorfrancis.com/chapters/edit/10.1201/9780429457791-61/evaluation-traffic-noise-state-qatar-md-ohiduzzaman-okan-sirin-emad-kassem>.

71. Fooladi MM. Involuntary and persistent environmental noise influences health and hearing in Beirut, Lebanon. *J Environ Public Health*. 2012(4):235618. 2012. [https://www.researchgate.net/publication/51732139\\_Involuntary\\_and\\_Persistent\\_Environmental\\_Noise\\_Influences\\_Health\\_and\\_Hearing\\_in\\_Beirut\\_Lebanon](https://www.researchgate.net/publication/51732139_Involuntary_and_Persistent_Environmental_Noise_Influences_Health_and_Hearing_in_Beirut_Lebanon).
72. AlQdah KS. The assessment and analysis of traffic noise pollution in the City of Amman. *Int J Environ Protection*. 4, 68 (2014)
73. ISO 2204:1979. Acoustics — Guide to International Standards on the measurement of airborne acoustical noise and evaluation of its effects on human beings. Status: Withdrawn. <https://www.iso.org/standard/7007.html>.
74. ISO 1996-1:2016. Acoustics — Description, measurement, and assessment of environmental noise - Part 1: Basic quantities and assessment procedures. Status: Confirmed in 2021. <https://www.iso.org/standard/59765.html>.
75. Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise. Brussels: European Commission. 2002. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32002L0049>.
76. Regulation (EU) No 540/2014 of the European Parliament and of the Council of 16 April 2014 on the sound level of motor vehicles and of replacement silencing systems and amending Directive 2007/46/EC and repealing Directive 70/157/EEC. Brussels: European Commission. 2014. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32014R0540>.
77. Directive 2004/50/EC of the European Parliament and of the Council of 29 April 2004 amending Council Directive 96/48/EC on the interoperability of the trans-European high-speed rail system and Directive 2001/16/EC of the European Parliament and of the Council on the interoperability of the trans-European conventional rail system. Brussels: European Commission. 2004. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:220:0040:0057:EN:PDF>.
78. Regulation (EU) No 598/2014 of the European Parliament and of the Council of 16 April 2014 on the establishment of rules and procedures with regard to the introduction of noise-related operating restrictions at Union airports within a Balanced Approach and repealing Directive 2002/30/EC, (2014). Brussels: European Union. 2014. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0598>.
79. Directive 2006/93/EC of the European Parliament and of the Council of 12 December 2006 on the regulation of the operation of aeroplanes covered by Part II, Chapter 3 , Volume 1 of Annex 16 to the Convention on International Civil Aviation, second edition (1988) (codified version). Brussels: European Commission. 2006. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32006L0093>.
80. Directive 2005/88/EC of the European Parliament and of the Council of 14 December 2005 amending Directive 2000/14/EC on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors. Brussels: European Commission. 2005. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32005L0088&from=ES>.
81. Directive 2000/14/EC on the approximation of the laws of the Member States of 8 May 2000 relating to the noise emission in the environment by equipment for use outdoors. Brussels: European Commission. 2000. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32000L0014>.
82. Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control). Brussels: European Union. 2010. <https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=celex%3A32010L0075>.
83. Handbook on the implementation of EU environmental legislation. Chapter 9: Noise legislation. Brussels: Directorate-General for Environment (European Commission), Hulla & Co Human Dynamics. 2016. <https://ec.europa.eu/environment/archives/enlarg/handbook/noise.pdf>.
84. Oman: Noise abatement technical note. Special Economic Zone Authority. Environment

Regulatory Department. June 2018. <https://duqm.gov.om/upload/files/noise-abatement.pdf>.

85. Saudi Arabia: A guide to preparing, improving air quality, and reducing visual and noise pollution.  
<https://www.moccae.gov.ae/assets/download/e7d122ba/%D8%AF%D9%84%D9%8A%D9%84%20%D8%A7%D9%84%D8%AA%D8%AE%D8%B6%D9%8A%D8%B1%20%D9%88%D8%AA%D8%AD%D8%B3%D9%8A%D9%86%20%D8%AC%D9%88%D8%AF%D8%A9%20%D8%A7%D9%84%D9%87%D9%88%D8%A7%D8%A1%20%D9%88%D8%A7%D9%84%D8%AD%D8%AF%20%D9%85%D9%86%20%D8%A7%D9%84%D8%AA%D9%84%D9%88%D8%AB%20%D8%A7%D9%84%D8%A8%D8%B5%D8%B1%D9%8A%20%D9%88%D8%A7%D9%84%D8%B3%D9%85%D8%B9%D9%8A.pdf.aspx>.
86. Saudi Arabia: Noise level measurement.  
<https://ncm.gov.sa/Ar/Environment/EnvironmentSector/EnvStandards/Documents/%D9%85%D9%82%D8%A7%D9%8A%D9%8A%D8%B3%20%D9%85%D8%B3%D8%AA%D9%88%D9%8A%D8%A7%D8%AA%20%D8%A7%D9%84%D8%B6%D9%88%D8%B6%D8%A7%D8%A1.pdf>.
87. Night noise guidelines for Europe. Copenhagen: WHO Regional Office for Europe.  
[http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0017/43316/E92845.pdf](http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf).
88. Guidelines for Community Noise. Berglund B, Lindvall T, Schwela DH, editors. Geneva: World Health Organization. <https://apps.who.int/iris/handle/10665/66217>.
89. Good practice guide on noise exposure and potential health effects. EEA Technical report No 11/2010. Copenhagen: European Environment Agency. 2010.  
<https://www.eea.europa.eu/publications/good-practice-guide-on-noise>.
90. Good Practice Guide for strategic noise mapping and the production of associated data on noise exposure. Final Draft. Version 2. European Commission Working Group. Assessment of Exposure to Noise. <https://sicaweb.cedex.es/docs/documentacion/Good-Practice-Guide-for-Strategic-Noise-Mapping.pdf>.