



# Situation Analysis of Ear and Hearing Care Program in Islamic Republic of Iran: System's Challenges and Proper Interventions

Saeid Mahmoudian<sup>1</sup>, Mohammad Farhadi<sup>1</sup>, Forouzan Akrami<sup>2</sup>, Seyed Kamran Kamrava<sup>1</sup>, Alimohamad Asghari<sup>3,1</sup>, Behzad Damari<sup>4\*</sup>

Received: 11 Oct 2020

Published: 29 Dec 2021

## Abstract

**Background:** More than 6.8% of the world's population suffer from disabling hearing impairment. Hearing impairment can cause lifelong or even life-threatening problems and has a significant impact on the health and quality of life. This study aimed to analyze the current situation of the ear and hearing care (EHC) in the frame of Iran health system.

**Methods:** This situation analysis was performed over a 5-year period (2013-2017) using the Strengths, Weaknesses, Opportunities, and Threats analysis method. First, after formation of the steering committee, all relevant published and unpublished articles and reports were reviewed and analyzed. In the next step, focused group discussion sessions (FGDs) were held with the participation of the experts, stakeholders, and Steering Committee members. Through the scissor-and-sort technique, the relevant data were highlighted and main categories evolved.

**Results:** The main challenges included inadequate health literacy, weak intrasectoral and intersectoral cooperation, the inadequacy of policy responses, nonintegration of the EHC in the primary health care system, poor standard processes, and resources of EHC, and lack of EHC surveillance system. The 6 major interventions and strategies extracted as identifying the capacities of both the public and private sectors, reinforcement of intersectoral cooperation and intersectoral collaboration, standardizing the processes and integrating of EHC services in the PHC, reorganizing the referral system, promoting hearing health literacy, and minimizing hearing loss risk factors.

**Conclusion:** Implementing the proposed interventions and strategies is essential to improve the situation of Iran EHC management system during the next 5 years.

**Keywords:** Hearing Care, Hearing Impairment, Hearing Loss, Situation Analysis, PHC, Iran

**Conflicts of Interest:** None declared

**Funding:** This study was funded and supported by ENT-Head and Neck Research Center of Iran University of Medical Sciences as a WHO Collaborating Center for Ear and Hearing Care Research and Education (IRA-49).

\*This work has been published under CC BY-NC-SA 1.0 license.

Copyright© Iran University of Medical Sciences

**Cite this article as:** Mahmoudian S, Farhadi M, Akrami F, Kamrava SK, Asghari A, Damari B. Situation Analysis of Ear and Hearing Care Program in Islamic Republic of Iran: System's Challenges and Proper Interventions. *Med J Islam Repub Iran.* 2021 (29 Dec);35:183. <https://doi.org/10.47176/mjiri.35.183>

## Introduction

Normal hearing is necessary for speech and language development as well as learning, social, emotional, and

communication skills (1). Hearing impairment (HI) can cause lifelong or even life-threatening problems and has a

**Corresponding author:** Dr Behzad Damari, [bdamari@sina.tums.ac.ir](mailto:bdamari@sina.tums.ac.ir); [mahmoudian.s@iums.ac.ir](mailto:mahmoudian.s@iums.ac.ir)

<sup>1</sup> ENT-Head and Neck Research Center and Department, The Five Senses Health Institute, Hazrat Rasoul Akram Hospital, Iran University of Medical Sciences, Tehran, Iran

<sup>2</sup> Research Center for Social Determinants of Health, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

<sup>3</sup> Skull Base Research Center, Hazrat Rasoul Akram Hospital, Iran University of Medical Sciences, Tehran, Iran

<sup>4</sup> Tehran University of Medical Science, Neuroscience Institute, Governance and Health Department, Tehran, Iran

### ↑What is "already known" in this topic:

Ear and hearing health problems in the absence of a comprehensive health policy are often addressed as deafness and disability.

### →What this article adds:

Ear and hearing care (EHC) is a public health problem and should be addressed through developmental interventions, including integration strategy in the PHC system, collaboration between different stakeholders to reduce the risk factors of hearing impairment, or deafness, as well as participation and empowerment of the community members.

significant impact on health and quality of life (2) through overlapping with or causing other diseases like increasing the frequency of depression (3), communication problems, dementia, (4) and cognitive disorders (5).

It is estimated that more than 6.8% of the world's population have disabling hearing impairment (DHI) (6). Global burden of disease studies indicate that HI was the 11<sup>th</sup> leading cause of years lived with disability (YLD) in 2010 and the fourth leading cause in both 2013 and 2015 (7-9). Also, considering YLD, adult-onset HI is the third cause of disability (4.8%) after depression (12.1%) and unintentional injuries (4.8%) (10). These facts indicate the necessity of preventing HI from beginning of life and improving global ear and health care (EHC) services. Thus, The World Health Organization (WHO) invite to prevent the long-term complications of HI in countries through an action for integration of EHC services in the primary health care PHC system (11).

More than 50% of HIs are preventable through proper public health actions, such as immunization, healthy habits, and effective treatment for both acute and chronic ear conditions. In order to provide such services, countries must have a strategic plan that takes into account the demographic profile, governance, and leadership, requirements, and resources. The EHC program included evidence-based and comprehensive interventions to prevent, identify, and treat ear diseases and HI and to rehabilitate and support people who suffer from hearing impairment (6).

“Healthy human being and comprehensive health” are emphasized in Iran policy documents. Iran is the second most populated country in the Middle East with 31 provinces and 79,926,000 out of which about 50.4% are men and 49.6% are women. Also, the urban area population is estimated 57,327,000. The age distribution of the population is 8.9% in the 0-5, 15.1% in 6-15, 66.7% in 16-60, and 9.3% in older than 60 years age groups. The crude

birth rate is 1.7, therefore, more than 1,500,000 babies born each year and about 40% of these deliveries take place in rural areas. The literacy rate of the total population was estimated 87.7% in the country (12).

Based on the recent data, the prevalence of DHI in Iranian infants is about 3 to 5 in 1000 (13-16). The Ministry of Health and Medical Education (MOH&ME) as the steward of health in the country has to take 3 roles of knowledge brokering, advocacy, and governance and leadership. Despite the country's success in implementing the Newborn Hearing Screening Program (NHSP), in such context, the way to agree and act upon the EHC interventions would be difficult and requires a great deal of intersectoral action and collaboration based on the analysis and the assessment of the EHC. Thus, this study aimed to analyze the current situation of the EHC management system of Iran and to provide some practical recommendations.

### Methods

In this qualitative study, the Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis was used to assess Iran's EHC situation over a 5-year period (2013-2017). The SWOT analysis method is an effective technique to assess the strengths, weaknesses, opportunities, and threats involved in a plan or a project in an organization or an institution (17).

In the first step, after formation of the steering committee, all relevant published and unpublished articles and reports were reviewed and analyzed. All indices of hearing health care according to the results chain, including input, process, output, and outcome, were identified to give a general picture of the current status.

In the next step, focused group discussion sessions (FGDs) were held with the participation of the experts, stakeholders, and Steering Committee members (Table 1). All stakeholders were selected according to their authority

Table 1. Members of the Steering Committee and Expert Working Groups

Groups	Expert Working Group
First group: Senior managers and policy makers	<ul style="list-style-type: none"> <li>• Representatives from the MOH&amp;ME, Deputy of Treatment Affairs, Clinical Governance Office and the Accreditation Office of Treatment Affairs</li> <li>• Representatives from the Deputy of Health, Center for Non-Communicable Disease Control, National Unit for Prevention and Control of Hearing Loss and Deafness, Center for Development Health Network, Center for Workplace Health, Office for the Health of the Family, Society, and School,</li> <li>• Head of Secretariat of the Supreme Council for Health and Food Safety (The secretary of the council)</li> <li>• The Vice-chancellor of Prevention of Disabilities in the Welfare Organization</li> <li>• Director in General for Health Affairs of the Ministry of Education</li> <li>• A representative from the Ministry of Cooperatives, labor and social welfare</li> <li>• The representative from WHO office and UNICEF</li> </ul>
Second group: Researchers and experts	<ul style="list-style-type: none"> <li>• A representative from WHO Collaborating Center for Research and Education on Hearing Loss and Deafness (ENT and Head &amp; Neck Research Center and Department, Iran University of Medical Sciences (Center of Excellence)</li> <li>• Two expert persons with the election of the council's head</li> </ul>
Third group: Service providers	<ul style="list-style-type: none"> <li>• The official representatives of Scientific Associations of Otolaryngology, Audiology, Pediatricians, Occupational Medicine, Occupational Health, General Practitioners, Social Medicine, and Nursing Science</li> </ul>
Forth group: People and service recipients	<ul style="list-style-type: none"> <li>• The Association of Iranian Deaf Family</li> <li>• The National Coordinator of Public Participation (Secretariat of the Supreme Council for Health and Food Safety)</li> </ul>
Fifth group: Media	<ul style="list-style-type: none"> <li>• The representatives of the Health Media in Television, Radio, and Valid Health Journals</li> </ul>

and influences. Also, we applied the snowball sampling method when the participants were invited for the FDGs. Overall, stakeholders were defined as decision-makers and policymaking authorities of the MOH&ME, related organizations, and scientific associations. Three sessions of FDGs were held to analyze the current state of the EHC system in the country. In each session, the questions were raised by a facilitator and by assigning a member as the session director, the discussions were recorded and transcribed with the group's informed consent. Through the Scissor-and-sort technique (18), the relevant data were highlighted and main categories evolved. Also, the "management system for EHC" was analyzed in 2 approaches. The indoor environment includes 3 components of stewardship for hearing health, which consists of program structure, intrasectoral (MOH&ME) coordination, advocacy, supervision and regulations, deaf people and human rights, intersectoral cooperation, and community participation. The second component is the resources, comprising

of financing, human resource, information, and facilities. Finally, the third component is health services, including prevention, treatment, and rehabilitation services. The external environment is divided into near and far fields. The near field is composed of the knowledge, attitude, and coordination between the stakeholders. The far field is the situation of economic, social, political, technological, international, and environmental factors.

## Results

### A. Statistics

The national indices of the situation of the EHC, along with other related health indicators, is reported in Table 2. According to a cross-sectional study on 6521 people in Tehran, Iran (2012- 2013), the total prevalence of HI and deafness is high (14.27%: 64.71% slight HI, 27.45% moderate HI, 4.58% severe HI, and 3.27% profound) (19). Most of the studies performed in Iran represented a significant trend in consanguineous marriage across 3 genera-

Table 2. Ear and Hearing Care (EHC) indicators in Iran

Core Indicators	Statistics
Leadership and Governance (National Registry of Hearing Impairment)	<p>The Coverage Rate of Hearing Newborn Screening Program (13,15) The Prevalence of Hearing Impairment (HI) by Grade in Provincial Capital Cities (13-16, 19, 24)</p> <p>Considering all ages and all degrees of HI:  <ul style="list-style-type: none"> <li>• The total prevalence of HI: 14.7% (95% CI, 11.53-17.91)</li> <li>• Slight HI: 9.52% (7.07-11.98)</li> <li>• Moderate HI: 4.04% (3.02-5.06)</li> <li>• Severe HI: 0.67% (0.33-1.02)</li> <li>• Profound HI including deafness: 0.48% (0.16-0.8)</li> </ul> </p> <p>Considering all newborns:  <ul style="list-style-type: none"> <li>• Severe HI in the Country: 2.6 per 1000</li> <li>• Profound HI in Fars Province: 1.5 per 1000</li> <li>• Bilateral Profound HI in Tehran Province: 1.1 per 1000</li> <li>• Bilateral Severe HI in Tehran Province: 1 to 4 per 1000 (well-baby)</li> <li>• Bilateral Severe HI in Tehran Province: 2.5 to 4.6 per 100 (ICUs)</li> <li>• Bilateral Severe HI in Mazandaran Province: 1.04 per 100 (ICUs)</li> </ul> </p> <p>1.8/1,000 newborns (Northern Iran) 2-3/1,000 (Hamedan &amp; Mazandaran) 7-8/1,000 (Kermanshah and Charmahal Bakhtiari)</p>
	<p>Maximum and Minimum Prevalence Rate of HI (16) Consanguineous Marriage among Parents of Deaf Children (22) The Mean Proportion of Consanguineous Marriages in Iran (20, 21) Number of Unemployed People (26) Health Literacy (31)</p> <p>65% 38.6% 80% of Deaf People The Ear and Hearing- Related Health Literacy was Inadequate in 97.2% of population</p>
Health Work force for EHC	<p>Number of Audiologists in Private Sector Speech and Language Therapists in the Public Sector</p> <p>109 Experts 135 Experts</p>
Hearing Health Care Centers	<p>Number of Audiology Centers Number of Newborn Hearing Screening Centers Number of Rehabilitation Centers Nationwide in 2001 Total Number of Hearing Screening Centers</p> <p>240 Centers 460 screening centers equipped to TEOAE and AABR Hearing Screening Tests 800 rehabilitation centers and 32 Family Rehabilitation Center for children with HI 381 Centers (354 non-governmental and 27 governmental)</p>
Deaf people coverage	<p>Deaf people Supported by a Welfare Organization Total Number of Deaf Students in Different Degree of Especial Schools During the Academic Year 2012-13 Prevalence of the Rehabilitation Center's Clients with Consanguineous Marriage The Number of Cochlear Implants has been done so far</p> <p>124215 Cases 8100 Cases 60%-70%  <ul style="list-style-type: none"> <li>• More Than 3000 Children Under 5 Years Old (2012)</li> <li>• Overall more than 10.000 CI up to 2017</li> </ul> </p>

tions of Iranian population (20, 21). The studies show that consanguineous marriage among parents of Iranian deaf children is nearly twice the total rate of consanguineous marriage rate (65% versus 38%) (20-22). In a study on Iranian candidates for cochlear implantation, the most common cause of the profound bilateral sensorineural hearing loss was hereditary (33%) (23).

The NHSP is currently conducted in 381 public and private maternity centers of 323 cities by collaboration between the MOH&ME and the Welfare Organization in early detection and intervention, with the coverage rate of close to 80% (13). The variety of coverage rate (52%-99%) indicates the existence of inequalities in newborn screening services between different provinces. The prevalence of DHI in Iran is 2.6 per 1000 live births with variety of 0.9 to 5.8 per 1000 across the country (13). The total prevalence of newborn HI was reported 2.41 per 1000 in the southwestern region of Iran, and 1.52 per 1000 of these newborns were affected bilaterally (15). The reported prevalence of permanent HI identified by NHSP was 1 to 4 per 1000, while this amount was increased to 3 to 5 per 100 in target screening groups (24, 25).

The overall situation of EHC in the country is summarized as follows:

None of the EHC services are integrated in the PHC system. The costs of screening tests were paid by the parents and also covered by both the MOH&ME and the Welfare Organization in some rural health centers and public hospitals. There were 800 rehabilitation centers nationwide in 2001, among which 32 centers were responsible for diagnosis and proper rehabilitation on hearing loss and deaf children. There were also 106 trade training centers attended by 4479 people with disabilities, 97 speech therapy centers were utilized by 11,638 people, 83

hearing assessment centers served 83,056 people, and several occupational medicine centers served 27,547 people (26).

The number of audiologists who were graduated from audiology programs was estimated at more than 1000 people (1.20 per 100,000 population). Also, the total number of otolaryngologists in the country was reported around 1100 experts (1.32 per 100,000 population). EHC services, including audiological and surgical services, are available at secondary and tertiary level health centers. The number of people who underwent cochlear implant surgery and rehabilitation was 3002 persons by the year 2016. The Cochlear Implant Services is supported by the MOH&ME as well as the Welfare Organization in the country. By the year 2005, a total of 1170 people were supported financially for cochlear implantation and rehabilitation services.

### B. SWOT Analysis

Based on the performance reports of the MOH&ME, the interventions on hearing care promotion in recent decades were limited to formulation stages and pilot studies. Unfortunately, these pilot programs were not evaluated for national implementation. To analyze the deafness prevention management system, a potential unit was considered at the National Council for Health and Food security that was assumed as the indoor environment. Then, the SWOT analysis was performed to evaluate it. Results of the SWOT analysis of Iran's EHC system are presented in Table 3.

Based on the results of the SWOT analysis, it was found that the indoor environment is mostly in the state of strength and the external environment for EHC system is in the state of threat situation (Table 4). The analysis of

Table 3. Results of the SWOT analysis of hearing health system in the country

Environment		Components		Results
Internal	Stewardship (program, structure, collaboration)	Resources (Financial and credit, human resources, information, facilities)	Services (service packages, coverage and distribution, continuity, integration, quality)	Strengths
	External	Mostly weakness	Mostly strength	Threats
	Close environment (knowledge, attitude, the action of stakeholders)	Distant environment (economic factors, social, political, technological, international, environmental)		
	Both opportunities and threat	Political (opportunity), economic (threat), social (threat), technologic (threat/ opportunity)		

Table 4. Analysis of hearing impairment and deafness prevention management system in Iran

Internal Environment	
Strengths	Weaknesses
Governance (Structure, National program, inter-sectoral coordination, advocacy, monitoring and control, , inter-sectoral collaboration, human rights and public participation )	
<ul style="list-style-type: none"> <li>• The formation of the national committee for ear and hearing Healthcare</li> <li>• The formation of EHC group in the Non-Communicable Diseases Center (NCDC)</li> <li>• Developing the national plan for ear health and prevention of hearing loss and deafness in NCDC</li> <li>• Coordination between involved organizations for optimal program implementation</li> <li>• Using the potential, capacities and experiences of other welfare organization</li> </ul>	<ul style="list-style-type: none"> <li>• Insufficiency of national data and evidence</li> <li>• Unclear goals and confusion between decision-makers and experts</li> <li>• Lack of job responsibilities and division of labor</li> <li>• The weak stewardship role of the MOH&amp;ME</li> <li>• Lack of systematic allocation of resources</li> <li>• Non-integration of EHC in PHC</li> </ul>

Table 4. Ctd

Internal Environment	
Strengths	Weaknesses
Resources (Funding, human resources, information, medicine)	
<ul style="list-style-type: none"> <li>• Availability of hearing impairment and deafness statistical information in the country (15 years' activity of welfare organization) and presence of the sufficient human resources in the country to carry out hearing screening</li> <li>• The possibility of expanding centers based on national needs to have the facilities for hearing screening, cochlear implants and rehabilitation centers</li> <li>• Having the experienced specialists for cochlear implantation in Iran</li> <li>• Low cost of hearing screening in the assessment plan for the families</li> <li>• The effective activities of certified audiologists by the MOH&amp;ME in the field of fitting and verification of hearing aid in the country</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of sufficient facilities and credits for investigation and intervention</li> <li>• Lack of a unit and effective educational content, lack of specialized training</li> <li>• A limited number of prostheses and the high cost of prostheses for cochlear implantation</li> <li>• Insufficient medical and surgical facilities to restore hearing</li> <li>• Lack of financial resources to prepare tools and treatment progress of the Deaf and rehabilitation measures</li> <li>• The cost of prostheses (prostheses like hearing aids and hearing instruments) in Iran is not covered by insurance</li> <li>• Absence of national information management system</li> <li>• Lack of EHC practitioners in PHC system</li> <li>• Lack of public hearing screening program for 3-5 years' children</li> </ul>
Service Provision (Health promotion, prevention, treatment, and rehabilitation)	
<ul style="list-style-type: none"> <li>• Neonatal screening program at the national level</li> <li>• the existence of 105 state audiology clinics and 126 state speech therapy clinics in the country</li> <li>• The existence of program guideline The existence of at least 11 active centers for cochlear implantation</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of general education programs for people</li> <li>• Lack of priority for the participation of the ultimate beneficiary (family), ignoring the adolescent age group</li> <li>• Some cities do not have a audiology clinic for later stages of EHC</li> <li>• Long waiting time (two years) for cochlear implant surgery</li> </ul>
External Environment	
Opportunities	Threats
Influencing Direct Factors (Knowledge, attitude, stakeholder activities)	
<ul style="list-style-type: none"> <li>• The readiness of various organizations to participate in the national program of prevention and control of hearing loss and deafness</li> <li>• Iran University of Medical Sciences is known as the excellence center for ear, nose, and throat in the region</li> <li>• Welfare Organization insurance for all the are exceptionally well-being people</li> <li>• The existence of the law for the 20 million IRR loan by the government to help patients seeking cochlear implant</li> <li>• The existence of the law on the employment of 3% of employees with disabilities in state organizations</li> <li>• Allocation of 30 million IRR subsidize by the Welfare Organization to the Associations</li> <li>• Comprehensive supervising on the students who are covered by special education.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of coordination between the Ministry of Education, Welfare Organization, and the Ministry of Health to follow up students with hearing impairment who are not undercover by the special education.</li> <li>• Differences in the statistics, information, and possible services for hearing impaired people</li> <li>• Due to the high costs of treatment and lack of financial ability, some parents prevent their children until the age of 2 to 3 years from receiving rehabilitation assistance.</li> <li>• Lack of educational programs on the radio and TV regarding hearing health</li> <li>• Failure to comply with acoustics principles in the construction of the buildings and ear protection safety principles in the workplace</li> <li>• Failure to comply with noise control law by the vehicles</li> <li>• Insufficient allocation of funds to the Deaf Associations</li> <li>• According to statistics provided by the Welfare Organization, there are still more than 26 thousand deaf or hard of hearing people in the country, who are in the waiting list to receive support from the Welfare Organization</li> <li>• The import of counterfeit hearing aids to the country</li> </ul>
Influencing Indirect Factors (Economic, social, political, technological, International, and environmental factors)	
<ul style="list-style-type: none"> <li>• The existence of related national documents</li> <li>• The policy of the eleventh government to focus on health</li> <li>• The possibility of benefiting from international experience in the field of prevention</li> <li>• Increasing role and impact of cyberspace</li> <li>• Partial attention to the role of macro factors in the incidence and prevalence of hearing problems</li> <li>• Rich cultural, religious, and national identity and its use as an opportunity for children's health</li> <li>• The gradual attention of officials and legislators, including the Expediency Council and the Parliament to the prevention</li> <li>• Legislation of the law on the comprehensive system of welfare and social security</li> </ul>	<ul style="list-style-type: none"> <li>• The economic impact of international sanctions</li> <li>• Increasing environmental damages in the region and its direct and indirect effects</li> <li>• Increasing incidence and prevalence of mental disorders and trend of elderly</li> <li>• High rate of consanguineous marriage among Iranian population</li> <li>• Increasing use of electronic hearing devices especially by young people</li> </ul>

hearing impairment prevention management system in Iran is classified and summarized in Table 4.

### C. Major Challenges

The 5 major challenges in the country for EHC promotion were as follows: (1) nonintegration of the EHC in

Table 5. Hearing Healthcare Promotion Interventions and strategies based on Situation Analysis

Programs	Projects
Promotion intervention	<ul style="list-style-type: none"> <li>Developing a media campaign to boost knowledge and attitude of different age groups in hearing health maintenance and promotion</li> <li>The inclusion of Hearing health promotion requirements (knowledge, attitudes, and skills) in medical practitioners, family physician and specialty's curriculum</li> <li>Integration of EHC standard content in genetic screening program at the time of marriage Parents and instructor's empowerment to pay attention to hearing impairment symptoms through a parent-teacher conference</li> </ul>
Facilitator interventions	<ul style="list-style-type: none"> <li>Evaluation of neonatal hearing screening program and implementation of promoted programs like a systematic referral, treatment, and rehabilitation system</li> <li>Evaluation of hearing screening program for preschool children and the implementation of the promoted program</li> <li>Evaluation of adequacy, efficiency and effectiveness of existing rules and legislation to fight noise pollution in the workplace, buildings, military sites</li> <li>Collaboration in conducting a survey of Public accessibility and utilization of genetic counseling services and propose related policy</li> <li>Analysis of situation of related health care services to the maintenance and promotion of hearing health (vaccination, reproductive health, referral system, ...)</li> <li>To establish mobile screening and intervention services in rural and peri-urban regions.</li> </ul>
Compulsory interventions	<ul style="list-style-type: none"> <li>Integration of EHC services in the PHC system</li> <li>Integrating the content of neonatal and childhood hearing screening program in well-baby booklet chart and training PHC staff to provide and register EHC services</li> <li>Package compilation (code) to deafness and hearing impairment support and its approval in insurance high council</li> <li>Compilation of supportive package (workbook) for hearing impairment and deafness</li> <li>The inclusion of monitoring hearing health indicators in country's observatory system and ranking of cities and provinces based on it</li> <li>Identifying and accreditation of all screening, diagnostic and rehabilitation centers of the country to reorganize the referral system</li> <li>Analysis and approval of evaluated hearing health screening programs in policy-making council and provision of implementation requirements and Advocacy for increasing the quality of maintenance and promotion of hearing health</li> <li>Development of hearing surveillance system</li> </ul>

the PHC system; (2) inadequate health literacy; (3) insufficient intersectoral cooperation, and inadequate EHC services regarding their extent and the coverage; (4) low intrasectoral coordination, nonorganized referral system; and (5) lack of an efficient EHC national surveillance system. The appropriate interventions and strategies were summarized in 3 categories (Table 5).

### Discussion

The situation analysis of Iran's EHC management system shows that the indoor environment, including management, resources, and services, is in a powerful state, but the external environment is generally threatened. Hence, the preliminary steps to develop interventions should be taken by the end of the sixth National Program of Development and followed with higher speed in the seventh National Program.

Analysis of the programs and policies revealed that although some policies were made to promote EHC in the past decade, they were not time-bound and did not follow the implementation, equitable distribution, financial-political commitment of stakeholders, or promoted EHC literacy. The results are compatible with the finding of the Kenna study, which showed that public prevention education is an important step toward improving hearing health of the community (27). Yamasoba et al also studied the noise-induced HI and showed that measures against noise pollution, such as community education, should be adopted to prevent HI and deafness (28).

Nonintegration of the EHC in the PHC system is a

major challenge to develop and implement the EHC program across the country. The WHO, in collaboration with international and nongovernmental organizations, designed the "Hearing 2030" program and called upon all governments to integrate EHC in the PHC system (29).

Identifying EHC capacities and developing an efficient national surveillance system is necessary to assess and plan for better HI prevention and control. It is also necessary to ensure the intrasectoral coordination and intersectoral collaboration to reorganize the referral system in order to improve EHC services and hearing loss prevention. Soltanzadeh et al have pointed to the lack of epidemiologic information and reminded the necessity of conducting comprehensive national surveys to develop health policies. They also mentioned that public training is necessary to hearing health promotion of the population (30).

Given the high rate of consanguineous marriages in Iranian population, premarital genetic counseling and mass media efforts are needed to increase public awareness about genetic risks associated with consanguineous marriage throughout the country (20, 21). The WHO recommends that HI be prevented with simple strategies, including immunization of children, girls, and young women; screening; and treatment of infections in pregnant women; improvement of care before and during birth; and promotion of safe deliveries; avoiding the use of ototoxic drugs; referring high-risk children for hearing assessment; and reducing exposure (both occupational and recreational) to loud noises

through creating awareness and use of protective equipment as well as passing legislations for appropriate regulations (6). Also, improving people's health literacy related to EHC can lead to the establishment of a healthy lifestyle and prevent the adverse consequences of poor ear and hearing-related health literacy (31).

It is clear that the provision of EHC services and their implementation in Iran is beyond the capacity of a health system such as MOH&ME or medical universities; and this matter definitely requires the commitment and cooperation of each of these sectors. The establishment of the National EHC Committee at the Center for Noncommunicable Diseases of the MOH&ME provides an opportunity to develop intrasectoral and intersectoral collaborations to prevent hearing impairment and reduce the burden of DHI in the country. Each part of the EHC program should develop its own strategic plan for dealing with hearing loss and its causes. Then, a national strategy should be developed according to the different conditions and cultural diversity of the society and the national EHC document should also be approved and implemented in the primary health care system. The lack of quantitative analysis was a limitation in this study. Our suggestion for further research is the evaluation of the standard program after its national implementation and integration in the PHC system.

### Conclusion

Implementing the proposed interventions and strategies is essential to improve the status quo of Iran EHC management system during the next 5 years. Timely action is needed to prevent and address hearing loss across the life course. We emphasized that the EHC should be addressed as a public health problem. Investing through cost-effective interventions will benefit people with HI and bring financial gains to the society. The MOH&ME must act to integrate EHC within national health plans to increase universal health coverage. This perspective will be provided through collaboration between different stakeholder organizations to eliminate the risk factors of HI, integrate the EHC services in the PHC system, ensure participation and empowerment of people, and conduct national epidemiologic surveys across age groups from neonates to the elderly.

### Acknowledgment

The authors wish to express their appreciation of the technical contribution made to this article by prevention and rehabilitation deputies of the Welfare Organization, the MOH&ME, and the Ministry of Education.

### Ethical Approval

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

### Conflict of Interests

S.M. and F.A. are members of the Noncommunicable

Diseases Office at the MOH&ME-Iran. S.M. is the director for the EHC, NCD Office at the MOH&ME. S.M. is the director of the WHO Collaborating Centre for Research and Education on Hearing Loss, Iran University of Medical Sciences. We have no conflict of interest to disclose.

### References

1. World Health Organization. Community-based rehabilitation promoting ear and hearing care through CBR. India: WHO2012.
2. Ciorba A, Bianchini C, Pelucchi S, Pastore A. The impact of hearing loss on the quality of life of elderly adults. *Clin Interv Aging*. 2012;7:159.
3. Li CM, Zhang X, Hoffman HJ, Cotch MF, Themann CL, Wilson MR. Hearing impairment associated with depression in US adults, National Health and Nutrition Examination Survey 2005-2010. *JAMA Otolaryngol Head Neck Surg*. 2014;140(4):293-302.
4. Gurgel RK, Ward PD, Schwartz S, Norton MC, Foster NL, T schanz JT. Relationship of hearing loss and dementia: a prospective, population-based study. *Otol Neurotol*. 2014;35(5):775-81.
5. Lin FR, Ferrucci L, Metter EJ, An Y, Zonderman AB, Resnick SM. Hearing loss and cognition in the Baltimore Longitudinal Study of Aging. *Neuropsychology*. 2011;25(6):763.
6. Wilson BS, Tucci DL, Merson MH, O'Donoghue GM. Global hearing health care: new findings and perspectives. *Lancet*. 2017;390(10111):2503-15.
7. Vos T, Barber RM, Bell B, Bertozzi-Villa A, Biryukov S, Bolliger I, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 301 acute and chronic diseases and injuries in 188 countries, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet*. 2015;386(9995):743-800.
8. Vos T, Allen C, Arora M, Barber RM, Bhutta ZA, Brown A, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2016;388(10053):1545-602.
9. Vos T, Flaxman AD, Naghavi M, Lozano R, Michaud C, Ezzati M, et al. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012;380(9859):2163-96.
10. World Health Organization. Primary Ear And Hearing Care Training Resource; Advanced Level 2006. Switzerland: Geneva: WHO; 2006.
11. Stevens G, Flaxman S, Brunskill E, Mascarenhas M, Mathers CD, Finucane M. Global and regional hearing impairment prevalence: an analysis of 42 studies in 29 countries. *Eur J Public Health*. 2013;23(1):146-52.
12. Iran Statistical Center. Iran Statistical Yearbook [2015- 2016]. Tehran: Presidency of I.R.I Plan and Budget Organisation; 2016. Available from: <https://www.amar.org.ir/english/Iran-Statistical-Yearbook/Statistical-Yearbook-2015-2016>.
13. Firoozbakht M, Mahmoudian S, Alaeddini F, Esmaeilzadeh M, Rafiei M, Firouzbakht A, et al. Community-based newborn hearing screening programme for early detection of permanent hearing loss in Iran: an eight-year cross-sectional study from 2005 to 2012. *J Med Screen*. 2014;21(1):10-7.
14. Hemmati F, Hojatpanah B. Frequency of Profound Congenital Hearing Loss in Healthy Newborn Infants in Fars Province. *Iran J Neonatol*. 2013;4(1):8-11.
15. Saki N, Bayat A, Hoseinabadi R, Nikakhlagh S, Karimi M, Dashti R. Universal newborn hearing screening in southwestern Iran. *Int J Pediatr Otorhinolaryngol*. 2017;97:89-92.
16. Haghshenas M, Zadeh P, Javadian Y, Fard H, Delavari K, Panjaki H, et al. Auditory screening in infants for early detection of permanent hearing loss in northern Iran. *Ann Med Health Sci Res*. 2014;4(3):340-4.
17. Sammut-Bonnici T, Galea D. SWOT analysis. *Wiley Encyclopedia of Management*; 2015:1-8.
18. Stewart DW, Shamdasani PN. Focus groups: Theory and practice. Third Edition ed. USA: Sage publications; 2014.
19. Asghari A, Farhadi M, Daneshi A, Khabazkhoob M, Mohazzab-Torabi S, Jalessi M, et al. The prevalence of hearing impairment by

- age and gender in a population-based study. *Iran J Public Health*. 017;46(9):1237.
20. Saadat M, Ansari-Lari M, Farhud D. Short report consanguineous marriage in Iran. *Ann Hum Biol*. 2004;31(2):263-9.
  21. Akrami SM, Montazeri V, Shomali SR, Heshmat R, Larijani B. Is there a significant trend in prevalence of consanguineous marriage in Tehran? A review of three generations. *J Genet Couns*. 2009;18(1):82.
  22. Ajallouyan M, Radfar S, Nouhi S, Tavallaie SA, Amirsalari S, Yousefi J, et al. Consanguinity among parents of Iranian deaf children. *Iran Red Crescent Med J*. 2016;18(11).
  23. Mahdieh N, Mahmoudi H, Ahmadzadeh S, Bakhtiyari S. GJB2 mutations in deaf population of Ilam (Western Iran): a different pattern of mutation distribution. *Eur Arch Otorhinolaryngol*. 2016;273(5):1161-5.
  24. Farhadi M, Mahmoudian S, Mohammad K, Daneshi A. The pilot study of a nationwide neonatal hearing screening in Iran: Akbarabadi and Mirzakouchak-Khan hospitals in Tehran (June 2003-October 2004). *Hakim Health Sys Res*. 2006;9(3):65-75.
  25. Tajik S, Ahmadpour-kacho M. Early Diagnosis and Intervention for Hearing Loss in Newborns Discharged from Intensive Care Units: a Four-year Follow-up Study in North of Iran. *Int J Pediatr*. 2016;4(8):3283-91.
  26. Alaedini P. Training and employment of people with disabilities: Iran 2003. Bangkok, International Labour Office, 2004 ISBN 92-2-115890-X (Web pdf format).
  27. Kenna MA. Acquired hearing loss in children. *Otolaryngol Clin North Am*. 2015;48(6):933-53.
  28. Yamasoba T, Lin FR, Someya S, Kashio A, Sakamoto T, Kondo K. Current concepts in age-related hearing loss: epidemiology and mechanistic pathways. *Hear Res*. 2013;303:30-8.
  29. World Health Organization. Addressing the rising prevalence of hearing loss 2018 February Available from: <https://apps.who.int/iris/bitstream/handle/10665/260336/9789241550260-eng.pdf>.
  30. Soltanzadeh A, Ebrahimi H, Fallahi M, Kamalinia M, Ghassemi S, Golmohammadi R. Noise induced hearing loss in Iran:(1997–2012): Systematic review article. *Iran J Public Health*. 2014;43(12):1605.
  31. Shams M, Farhadi M, Maleki M, Shariatini S, Mahmoudian S. Ear and Hearing-related Health Literacy Status of Iranian Adolescent and Young People: A National Study. *SJKU*. 2020;25(1):43-53. <http://sjku.muk.ac.ir/article-1-4634-en.html>