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Recognition of Hearing Impairment Disability: First Comprehensive Study on the Deaf in Lebanon

Jules Joel Bakhos[1, 2, *], Ghassan Sleilaty[2], Dany Khalaf[1, 3], Rola Bou Serhal[2], Karen El Boustani[4], Elias Lattouf[2], Gerard Elie Bakhos[2], Nadira Samaha[1], Fadi Abou-Mrad[1, 3]

[1]Division of Medical Ethics, Faculty of Medical Sciences, Lebanese University (LU), Hadath, Lebanon

[2]Faculty of Medicine, Saint-Joseph University (USJ), Achrafieh, Lebanon

[3]Department of Neurosciences, Saint-Charles University Hospital, Baabda, Lebanon

[4]Faculty of Pharmacy, Lebanese American University (LAU), Beirut, Lebanon

Email address:

julesjoelbakhos@gmail.com (J. J. Bakhos)

[*]Corresponding author

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Abstract: People with disabling hearing disabilities face multiple levels of daily-life challenges where access to services and information remain difficult. In Lebanon, no data is available about the hard-of-hearing individuals. The aim of the study is to reflect the current situation of the Deaf community in Lebanon, to compare it with that of the general Lebanese population and propose practical ways to improve their national status and quality of care. A snowball sampling method was used to recruit hard-of-hearing individuals over the age of eighteen, via institutions and schools for the Deaf. Participants were asked to anonymously fill a qualitative questionnaire, individually or in groups in the presence of interpreters. The analysis was descriptive, and 95% binomial exact confidence intervals were constructed to compare parameters with those of the general population. Deaf adults in Lebanon have poorer socioeconomic conditions, lower literacy levels and limited access to information. However, they appear to be physically healthier than the general population while presenting frequent mental health problems and facing discrimination and poorer access to services. There still is no valid data available about the Deaf community in Lebanon. Hard-of-hearing people remain underserved by the current Lebanese healthcare, education, employment and public systems.

Keywords: Hard of Hearing, Deaf, Lebanon, Lebanese Deaf Population, Lebanese Sign Language, Law 220/2000

1. Introduction

In 2018, the World Health Organization (WHO) released numbers on the magnitude of disabling hearing loss. Around 466 million people (6.1% of the world's population) had hearing disabilities, among which 93% were adults (242 million males, 190 million females) and 7% were children [1].

Behind these numbers resides a handicap of multiple faces. Depending on the degree and age of deafness onset, communication modalities and social integration, the hard-of-hearing (HH) individuals evolve differently and encounter multiple types and levels of daily life challenges. For instance, even in developed countries, adherence to primary care by deaf people is still very challenging despite the growing number of Deaf health programs and research initiative [2, 3].

In Lebanon, and according to the Central Administration for Statistics, there are no statistics on the disabled population [4]. According to the Word Federation of the Deaf (WFD), they were around 12,000 in 2008 [5], representing 10.10% of the invalidity cards granted by the Lebanese Ministry of Social Affairs [6]. However, in 2014, the ministry announced there were 95,618 persons with disabilities in Lebanon among which 8.7% had hearing or speech disabilities.

Furthermore, in Lebanon, there still is no unified consensus on Lebanese Sign Language (LSL) to be taught

and used officially in the country.

In 2000, Lebanon adopted Law 220 on the Rights of Disabled Persons (Law 220/2000). The law is mainly built around a set of rights integrating citizens with disabilities into social and economic life, through employment, transport and housing quotas, and guarantees of health and educational services [7].

In view of these findings and the few studies published on this subject worldwide [8], no data has been found to describe the Deaf situation in Lebanon. Therefore, it is of major importance to directly question the Lebanese deaf population (LDP) on their habits and study their demographics and their relationship with healthcare, society and Law. The aim of the study is to reflect the current situation of the Deaf community in Lebanon, to compare it with that of the general Lebanese population (GLP) and propose practical ways to improve their national status and their quality of care.

2. Methods

2.1. Target Population & Sample

As no register of deaf people exists in Lebanon, it was not possible to recruit a random sample of the LDP. Instead, a sample was built to match the adult GLP and to represent the main populated areas.

The population of interest or study population consisted exclusively of hard-of-hearing people, over the age of eighteen.

Questionnaires were filled between December 2017 and May 2018.

Moreover, in order to obtain a diversity of opinions without selection bias, a snowball sampling method was used and they were recruited on a voluntary basis via seven local Lebanese associations and schools for the Deaf. This sampling was made as such to increase case mix, in a way to represent the LDP according to age, gender, education, socio-professional category, area of residence and religion.

2.2. Building the Questionnaire

A qualitative questionnaire was distributed digitally and/or on paper in Arabic, French and English (the three main languages spoken in Lebanon), to be filled anonymously by a diverse sample of Deaf people. Questions were inspired from existing standardized questionnaires [9-11] upon which other elements were added and some were removed to fit the Lebanese culture.

The instrument was pilot-tested and revised prior to implementation.

The final questionnaire included 78 questions, categorized under five main themes: demographics [onset, cause and level of hearing loss; education; means of communication; employment; level of autonomy], society [social stigmata; sexuality; family; children], healthcare [coverage; satisfaction; sign language interpreting; medical care], risk factors [obesity; blood pressure; diabetes; dyslipidemia; heart diseases; smoking and alcohol consumption; physical activity (assessed between active and sedentary lifestyle); interpersonal violence; depression (no medical explanation was provided to define depressive disorder); suicide (ideation and attempts); medical vocabulary and diseases knowledge], and law [we asked the LDP if they were aware of law 220/2000 and their opinion about it, its execution and its missing aspects].

On average, the time spent on survey completion was 50 minutes.

2.3. Administration of the Questionnaire

The Deaf completed the questionnaire on their own, or in groups during meetings organized by the associations. The presence of an interpreter/translator delegated respectively by each association facilitated the completion of the survey. This kind of help was favored because the Deaf did not have total understanding of the vocabulary and language, and would have difficulty answering the written questions; secondly, in terms of recruitment, it would have been hard to access a large number of marginalized persons individually.

2.4. Ethics, Data Collection & Analysis

An institutional review board approval was obtained from the Ethics Board of the Lebanese University Faculty of Medical Sciences (2017/10/ع0).

Anonymity was guaranteed: the investigator highlighted the confidentiality of the answers. The questions were tackled voluntarily after fully understanding the aim and purpose of the study. The answers were then collected and computerized by three different investigators in three different time frames for optimal transcription conditions.

2.5. Statistical Analysis

Comparative data for the hearing GLP were extracted from the 2012 National Health Statistics Report in Lebanon [6]. The analysis was descriptive, and 95% binomial exact confidence intervals (CI) (using Jeffreys priors) around observed percentages were constructed to check whether they contain the theoretical percentage, that is, the percentage in GLP.

3. Results

3.1. Demographics

3.1.1. Sample

In total, 133 subjects were included in the study. The participants, aged from 18 to 80 years, formed the study sample that was made up of 76 women (57%). The mean age was about 34.7±17.5 years old.

The sociodemographic and anthropometric characteristics of the LDP sample are shown in Table 1, alongside those of the GLP. Young adults aged 18–24 years were over-represented and the elderly over the age 65 were under-represented (Table 1).

Table 1. *Age groups and governorates distribution of deaf respondents in comparison with the general Lebanese population.*

Governorates (Districts)	GLP (%) N=3'961'820	LDP (%) N=133	CI
Beirut	9.6	20.5	20.5% [14.3% - 28%]
Mount Lebanon	38.1	41.2	41.2% [33.1% - 49.7%]
Northern Lebanon	20.6	23.9	23.9% [17.3% - 31.7%]
Beqaa	13.5	6.8	6.8% [3.4% - 12%]
Southern Lebanon	11.3	4.2	4.2% [1.7% - 8.6%]
Nabatieh	7	3.4	3.4% [1.2% - 7.5%]

97% of the deaf participants were holding disability cards issued by the MOSA.

The subjects of the LDP were from Mount Lebanon (41.2%), Beirut (20.5%), Northern Lebanon (18.8%), Akkar (5.1%), Southern Lebanon (4.2%), Baalbek-Hermel (3.4%), Beqaa (3.4%) and Nabatieh (3.4%) (Figure 1).

From the religious point of view, 90% said to be believers *versus* 3% of atheists and 7% who did not answer the question.

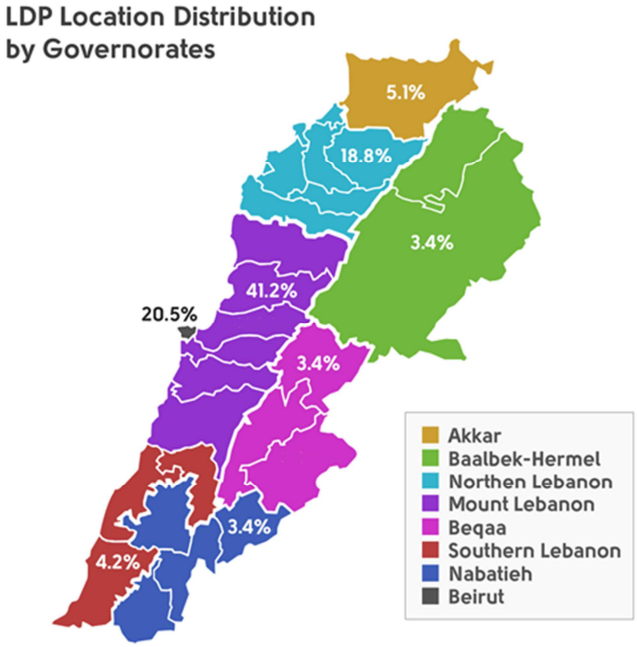

Figure 1. *LDP location distribution by governorates.*

3.1.2. Onset, Cause & Level of Hearing Loss

The LDP reported three main categories for onset dates of hearing loss: 56% at birth, 43% during early childhood and 1% at adulthood (Figure 2). The etiology was attributed to congenital causes by 63% of the participants, while 23% incriminated acquired diseases and 12% to accidents during early life (Figure 2).

Regarding the level of hearing impairment, 46% were deaf, 16% considered themselves as very hard of hearing (HH) individuals, and 37% as HH, whereas only 1% reported mild hearing loss (Figure 2).

The majority of the LDP (84%) used hearing aid devices (Figure 2). This made the perceived hearing impairment levels (with hearing aid devices) shift to: 11% deaf, 22% very HH, 65% HH, and 2% close to normal hearing (Figure 2).

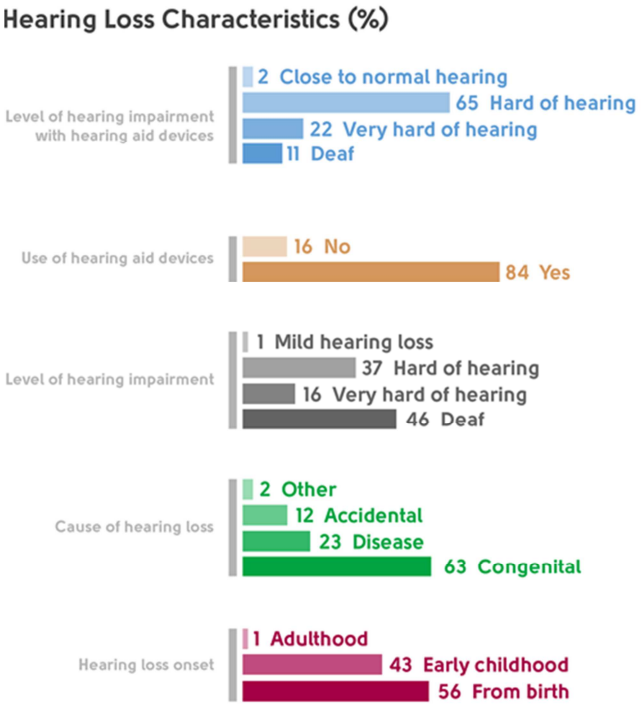

Figure 2. *Hearing Loss Characteristics.*

3.1.3. Education

Considering school curriculum, 5% of the LDP sample reported terminating their education with elementary school (kindergarten – 5th, 6th grades), 28% with middle school (6th – 8th grades), and 8% with high school (9 – 12th grades). As for graduate and post-graduate programs, 7% were bachelor's degree holders (*versus* at least 38% of the GLP [12]), with only 1% holding a doctorate degree (Figure 3).

Regarding career schools, 42% (95% CI 34.0% 50.6%) of the LDP were enrolled in vocational schools (32% secondary, 10% post-secondary) *versus* a 32% rate found in the GLP [12] (Figure 3).

For the LDP, school education was compatible with sign language (93%), whereas university was not.

3.1.4. Means of Communication

For their interaction with each other and with the outside society, the Lebanese Deaf use mainly six means of communication (Figure 3): sign language (71%), writing (60%), gestures (54%), online communication applications (typing and video messages: 24%), lip reading (15%), and talking (22%).

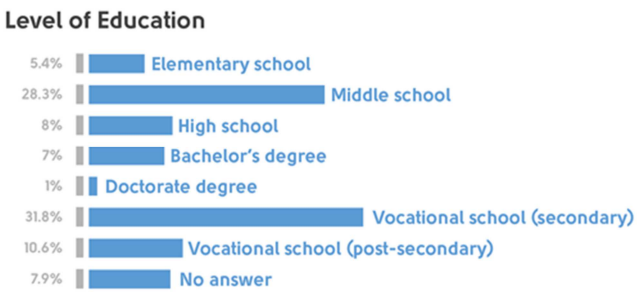

Figure 3. *LDP Level of Education.*

3.1.5. Employment

In comparison with the GLP, the LDP is more active in terms of employment with a 64% (55.5% - 71.7%) rate *versus* 48% [6] (Figure 4).

As for the nature of work, the LDP depended mainly on manual jobs that were craft and art related, needing little contact with hearing people. Services were not their job type of interest, in contrast with the GLP settings where it is preferred by 39% of the individuals [6].

The income question was answered by 30 members and, on average, an LDP individual makes 570±215 US dollars per month, a number that is slightly superior to that of the minimum wage in Lebanon (450$), but markedly inferior to that of the GLP [6].

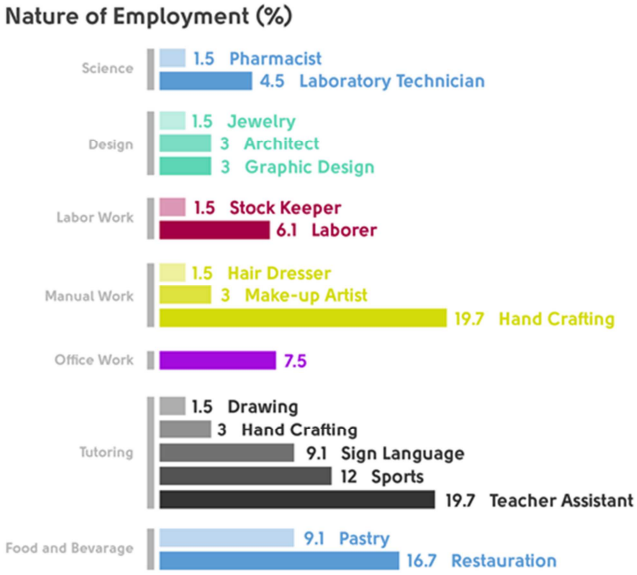

Figure 4. *LDP nature of employment.*

3.1.6. Autonomy & Assistance

The LDP reported being totally autonomous in 28% of the cases, partially autonomous in 57%, and one-sixth of them considered themselves dependent on the help of others. The activities needing assistance were reported as follows: social communication (51%), driving (33%), shopping (26%), public transportation (24%), medical appointments (15%), governmental affairs (8%), phone calls (4%), traveling (3%), housing (1%) and bank visits (1%) (Figure 5).

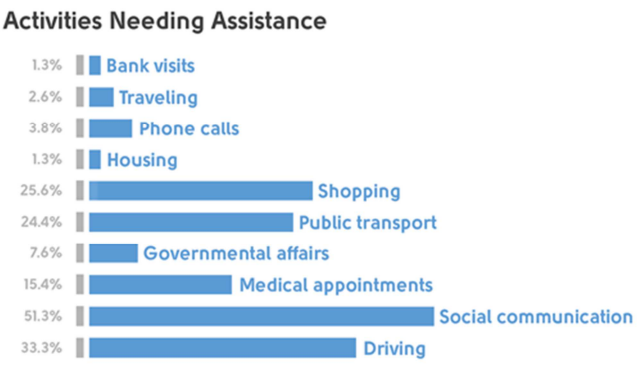

Figure 5. *LDP daily-life autonomy: activities needing assistance.*

3.2. Society

3.2.1. Interpersonal Relationships

For the LDP, the Lebanese society did not treat them well: they were stigmatized, shamed, bullied, avoided, neglected and treated with pity in 62% of the cases, while only 38% considered they were well treated (help, kindness, normal) (Figure 6).

In contrast, when asked about their outings, the majority of the LDP (94%) reported going out on social occasions.

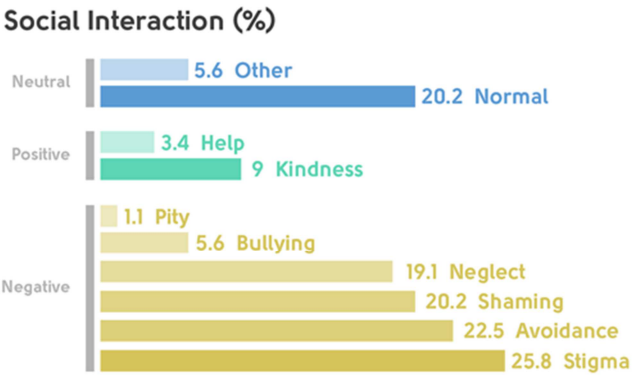

Figure 6. *Social interaction with the LDP.*

3.2.2. Sexuality, Family & Children

While 24% of the LDP reported being sexually active, 30% were not active and 46% have chosen not to answer the question.

Overall, 75% (95% CI 67.4% – 81.9%) of the Deaf were single *versus* 56% of the GLP, 23% (95% CI 16.7% – 31.0%) were married *versus* 39%, and 2% (95% CI 0.2% – 5.4%) were divorced *versus* 0.9% [12].

When asked about children, there was no case of reported children without marriage. 76% of the LDP had no children, 9% had only one, 12% had two children, 2% had three, and only 1% reported having four children.

Concerning the will to adopt children, only 16% were positive whereas the majority refused the idea.

3.3. Healthcare

3.3.1. Healthcare Coverage

Regarding healthcare coverage, 53% (95% CI 44.2% – 61.0%) of the LDP had public insurance versus 29% for the

GLP, 43% (95% CI 34.7% – 51.3%) were privately insured versus 71% of the GLP, 7% (95% CI 3.4% – 12.0%) reported having complementary healthcare insurance programs compared to 26% for the GLP, and 3% (95% CI 1.0% – 7.0%) of deaf participants reported not being covered by any (Figure 7) [6].

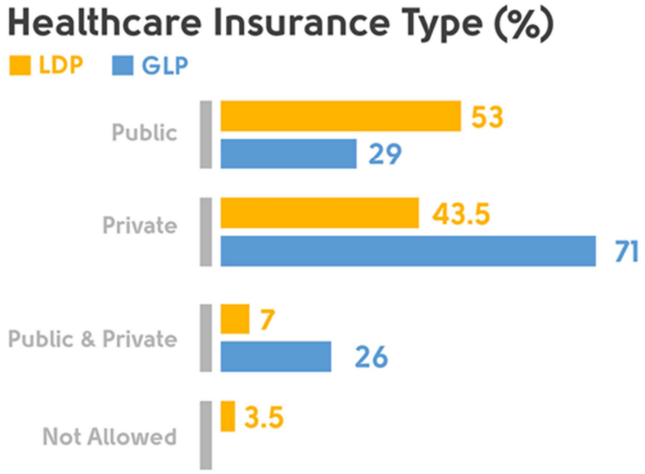

Figure 7. *LDP versus GLP insurance coverage.*

3.3.2. Healthcare System Satisfaction

Individuals with hearing impairment demonstrated some level of dissatisfaction with quality of healthcare. Overall, when asked about satisfaction with medical information, medical follow-up, deaf and hard-of-hearing (DHH) specialists, cost and reachability/accessibility, the LDP's opinions were diverse (Figure 8, A).

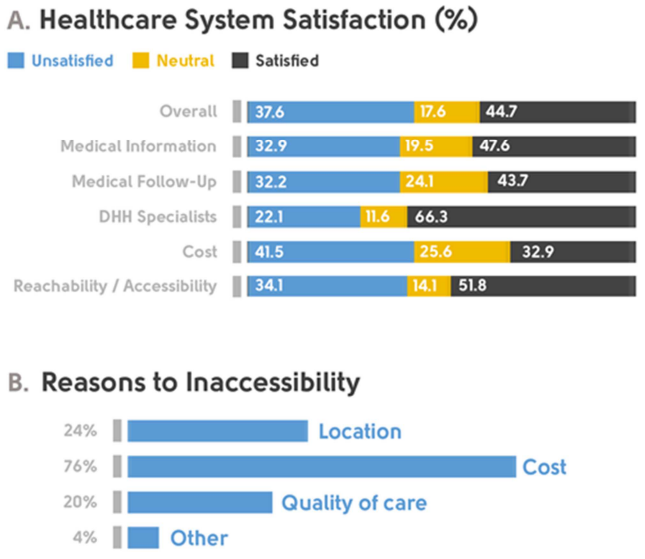

Figure 8. *Healthcare satisfaction and inaccessibility: A) LDP healthcare satisfaction; B) Reasons for healthcare inaccessibility.*

Most of the LDP (66%) were satisfied with their DHH specialists and perceived their physicians as competent and well trained, but report other problems such as incomplete understanding of clinical histories and conditions and impaired communication.

Concerning dissatisfaction with healthcare reachability and accessibility, the LDP reported three main causes: cost (76%), location (24%), and the quality of care (20%) (Figure 8, B). When asked about available DHH friendly physicians, the deaf people were positive at a 76% rate.

3.3.3. Sign Language Interpreting

As for sign language interpreters, 60% of the Lebanese Deaf report that such service is unavailable, whereas 40% report its availability with a 70% rate of service satisfaction.

For most of the LDP, the reasons behind sign language interpreting service inaccessibility are: quality of care (54%), cost (31%) and location (20%).

3.3.4. Usage of the Medical System

12% of the LDP mention visiting the emergency department in the past year, and 56% report forgoing needed healthcare service because of elevated cost (60%) and bad medical care (40%).

LDP subjects report the following preventive measures: vaccination (83%), routine blood testing (88%), cardiac exploration (32%), liver function (9%), kidney function (12%), bone densitometry (21%), breast exam for women (21%), prostate exam for men (8%) and colon exploration (8%) (Figure 9).

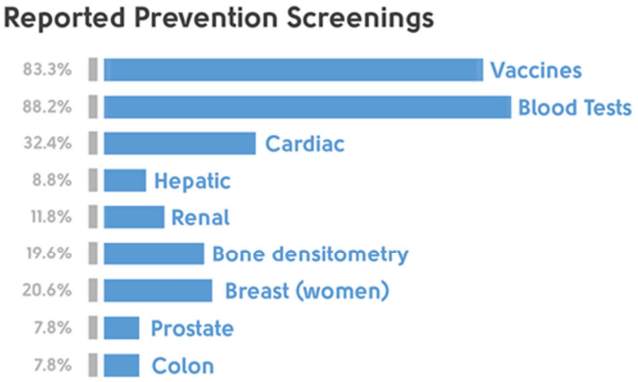

Figure 9. *Reported Prevention Screenings.*

3.4. Cardiovascular Risk Factors

3.4.1. Obesity

Overall, 28% (95% CI 20.7% - 35.9%) of the Deaf participants were overweight (BMI 25-30), and 9% (95% CI 5% - 14.8%) were clinically obese (BMI>30). In the study of Sibai & Hwalla conducted on a representative sample of the adult Lebanese population [13], 73% of the sample were classified as overweight, whereas 27% were obese (Table 2). Thus, in terms of overweight and obesity, the LDP is healthier than the GLP.

3.4.2. Blood Pressure

The frequency of arterial hypertension was lower in the LDP population (10.5%, 95% CI 6.2% - 16.6%) than that reported in the GLP (36.9%) [14]. Furthermore, LDP subjects controlled better their hypertension (63.6%, 95% CI 55.5% - 77.1%) compared to GLP (27%) [14].

Table 2. *LDP Body Mass Index in comparison with GLP.*

Classification	BMI (Kg/m^2)	GLP (%)	LDP (%)
Underweight	< 18.5	0	7.5
Normal Weight	18.5 – 24.9	0	55.6
Overweight	25 – 29.9	73	28.3
Obesity Class 1	30 – 34.9	No data	5.7
Obesity Class 2	35 – 39.9	27	2.9
Extreme Obesity Class 3	> 40	No data	0

3.4.3. Diabetes

The reported prevalence of diabetes among the Deaf participants was 7.3% (95% CI 3.9% - 12.9%), significantly different from that of the GLP, the latter being at least the double with a prevalence of 14.02% in 2010 The LDP were found to control their diabetes in 50% of the cases.

3.4.4. Dyslipidemia (Cholesterol/Triglycerides Abnormalities)

Dyslipidemia was comparable in both populations: 11.5% (6.7% - 17.5%) of the LDP reported serum lipid abnormalities whereas 15% the GLP had dyslipidemia [6]. LDP subjects had a better monitoring of dyslipidemia with a 72.7% tight control of their cholesterol and triglyceride levels.

3.4.5. Heart Diseases

Deaf people self-reporting cardiovascular diseases were significantly less than the general population prevalence: 3% (95%CI 1.0% - 7.0%) *versus* 49.8% [6]. The types of the diseases were not reported by the LDP subjects.

3.4.6. Smoking & Alcohol Consumption

Among the LDP, 31% (95%CI 23.5% - 39.0%) reported smoking (9.1% cigarettes - 22.7% water-piping), a percentage not significantly different from that of the GLP (39%) [6].

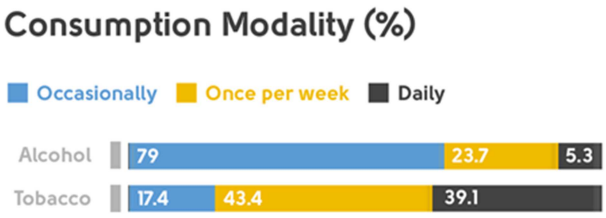

Figure 10. *Alcohol and tobacco consumption modalities.*

Concerning alcohol consumption, the LDP reported rate was 50% (95% CI 41.2% - 58.1%) a number significantly higher than that reported in the GLP (21%) [6]. The preferred LDP alcoholic beverage was beer (41.8%), followed by wine (37.3%), vodka (19.1%), whiskey (17.3%) and Arak (17.3%).

Concerning consumption modalities, smoking was considered to be a daily basis use product (39.1%), in contrast with alcohol that was mainly consumed on occasions (79%) (Figure 10).

3.4.7. Physical Activity

Almost half of the individuals in the GLP (46%) showed low physical activity [6], whereas the LDP reported being significantly more active at a 94% (95% CI 89.0% - 97%) rate.

3.5. Interpersonal Violence

19% of the LDP report being abused by the society: 16% of psychological violence, 2% of physical abuse, and 1% of forced sex. Around 70% of the LDP decided not to answer that question.

3.6. Depression

The rate of self-reported depression was 11.6% with 27% of the LDP reporting ongoing depression. In comparison with the GLP's one year depressive disorder prevalence, the difference was significant (11.6% *versus* 4.9%) [15]. However, when compared with the lifetime prevalence of reported depression in the GLP [16], the difference is not significant: 11.6% versus 9.9%.

For the LDP, overcoming depression with prayer, sports and family support was as important as medication.

3.7. Suicide

The LDP reported suicidal thoughts in 2.8% of the cases with a 28% rate of unanswered questions. This result is comparable with that conducted on Lebanese people in Beirut (2.09%) [17].

As for suicide attempts, the Deaf reported it at a 1.3% rate with 32% of the LDP choosing not to answer that question. In comparison with the results of the GLP, there was no significant difference: 1.3% *versus* 0.72% [18].

3.8. Medical Vocabulary & Disease Knowledge

Ignorance of medical terms represent a risk factor of great importance [18]. In fact, 78% of the LDP report a lack of knowledge in medical vocabulary.

For sexually transmitted diseases (STDs), there were no answers about actual or past infections, and 83% of the LDP reported not knowing any of the STDs. Only a few were aware about some of the STDs: human immunodeficiency virus (HIV) and its related acquired immunodeficiency syndrome (AIDS) (15%), human papilloma virus (4%), gonorrhea (4%), herpes virus (3%), and Chlamydia (2%).

3.9. Legal

The LDP report many legal problems among which driving license, divorce, fraud, neglect, and overall, 31% were resolved whereas 69% were not resolved or were still ongoing (15% not resolved, 54% ongoing resolution). Interestingly, 73% of the resolved cases were not in the Deaf's favor.

When asked about the 220/200 Law, the majority of the LDP (55%) were not aware of it.

Among those who were aware of it, 44% think the Law is fair, 17% think it is discriminating, and 39% of the LDP have decided not to answer.

We sought the LDP's opinion about the unexecuted articles of the Law 220/2000, and its missing aspects, and regrouped their answers in Table 3.

In Table 4, we present the objective assessment of the law

220/2000: its applicable articles and those that are not or partially in application.

Table 3. *Unexecuted articles and missing aspects of Law 220/2000 (by LDP).*

Law 220/200: unexecuted articles	Percent	Law 220/20 Law 220/200: missing aspects 00: missing aspects	Percent Percent
Interpretation services	10%	Municipality fees exemption	3%
Driver's license	11%	Healthcare access	5%
Fees exemption	8%	Financial aid	3%
Unemployment salary	5%	Special housing prices	4%
Unify the LSL	2%	Employment access	2%
Education access	9%	Interpretation services	3%
Employment access	11%	Law 220/2000 application	3%
Healthcare access	9%	Car registration	3%
Parking lot	1%	Lower hearing aid devices prices and enhance quality	3%
"I don't know"	65%	Television interpretation	3%
		Special mobile phone internet packages	6%
		Free access to education	2
		"I don't know"	78%

Table 4. *Objective ground assessment of the law 220/2000.*

Articles applicable	Articles partially applicable		Articles not applicable		
1-26: forming/organizing the national council for the disabled affairs	27: healthcare access	62: official exams	30: workplace accident prevention	48: public parking lots	67: supporting and organizing sports for the disabled
53: specially designed car warranty	28-29: full healthcare coverage (applicable in case of hospital agreement)	64: awareness	33,34: minimum wage	50: violations of the rights of private parking lots	68: extent of rights to work and employment
69: conditions of employment	29: covering entities	66: sports for the disabled	35: licenses and statements	51: trainings	70: guidance to labor market
72: activation committee on employment for the disabled	31: awareness	75: benefits in case of additional employment	36-37 : buildings, public and private facilities	52: driver's license	71: unemployment compensation
76: various legislative amendments	32: Health, Rehabilitation and Support Services Committee (formed but still inactive)	77: work emergencies	38: exceptional exemptions from qualification requirements	54: driver training sessions	73: allocation of jobs in the public sector
78 -82: amendments on the right of disabled persons to social benefits	41: exemptions	83: customs and import fees exemptions	39: rehabilitation of private places	55: housing	74: allocation of jobs in the private sector
86-93: miscellaneous tax provisions for the disabled	46: financial benefits and discounts	85: transport exemption fees (presently only applicable for physically disabled people)	40: transmission and teaching of minimal standards	56: housing guarantees in selling and renting	84: encouraging national manufacturing of equipment for the disabled
	49: private parking lots	100: application of Law 220/2000	42: fines	57: cost of rehabilitation of private housing	94: tax emptions for the associations of the disabled
	59: extent of rights to education	101: canceling infringing texts with Law 220/2000	43: world logo of the disabled	58: housing loan facilitation	95: additional fines
97: judicial fees exemption			44: adapted public transport	61: cover education expenses within specialized institutions	96: postage fee exemption
	60: adherence to educational institutions	102: Law 220/2000 enforcement	45: not adapted public transport	63: specialized committee of education	98: special measures for electoral processes
			47: penalty for refusal of transport	65: education training sessions	99: lottery

4. Discussion

4.1. Study Strengths & Limitations

Deaf people in general are difficult to identify and to recruit from the general population. They are therefore rarely solicited for research work.

In Lebanon, reaching the LDP and collecting their answers constituted a challenging task as they were hard to identify and follow. Young adults aged 18–24 years were over-represented and the elderly over the age 65 were under-represented (Table 1) but such variations were similarly found in other major studies [11].

The geographical distribution of the sample was roughly comparable with that of the GLP, the districts of Beqaa and Southern Lebanon being under-represented, and the governorate of Beirut over-represented (Table 2).

Most of the deaf participants lived in urban spaces, explaining their accessibility via their associations, while answers from deaf people living in rural areas, socially isolated and with a lower level of education, were hard to collect. Nevertheless, this work brings interesting answers about a population never previously investigated, and makes the current study the first comprehensive one realized on the Deaf adults in Lebanon.

According to the UNESCO [4], the estimates of DHH people in Lebanon exceed the number of card holders. The reluctant registration can be related to many factors among which we cite: the narrow definition of disability adopted by the Ministry of Social Affairs (MOSA), the social stigma and shame, the lack of information and the lack of trust in the Lebanese government managing their rights. However, in the current study, 97% of the respondents were disability card holders, and that could be related to the fact that most of the participants were recruited via Deaf associations.

Mixed methods were used to obtain standardized results on the LDP: literature comparison, questionnaire filling and interview data. Data were self-reported without access to individuals' health records by virtue of the anonymization process. Self-report of medical problems can be associated with bias in both directions—an exaggeration of medical, or an under-reporting of chronic conditions through lack of awareness, denial or poor communication with the medical professional

The data sets that were used to provide comparisons with the Lebanese hearing population were derived mainly from the second edition of the "National Health Statistics Report in Lebanon" [6], compiling data available from different public and private health agencies in Lebanon, and have their own limitations (date of issue, sample power).

4.2. Ground Realities & Barriers

4.2.1. Lebanese National Crisis

Since 2019, Lebanon endured multiple crises, including a massive explosion in Beirut's port, an economic collapse, rising political instability, and the COVID-19 global pandemic, all of which endangered residents' basic rights, especially the Deaf.

According to the World Bank, the economic crisis and the Covid-19 pandemic severely affected the medical sector, endangering the ability of hospitals to provide life-saving care. Basic rights are being denied as people are unable to afford or access basic goods and services including health, food, education, electricity, water and wastewater management. The Lebanese Pound has lost 90 percent of its value since October 2019 and unemployment has skyrocketed, eroding people's ability to access basic goods.

Presently, 78% of Lebanon's population is living in poverty. The share of households deprived of health care increased from 9% in 2019 to 33% in 2021, equivalent to approximately 400,000 households out of 1,210,000, while 55% of the population is not covered by any form of health insurance. Furthermore, the share of families who are unable to obtain medicines has increased to more than half (52%), equivalent to 630,000 households.

4.2.2. LDP Characteristics

Regarding the reasons of deafness onset, 56% of the LDP were deaf at birth, whereas 43% were deaf from early childhood. These numbers corroborate those of the study of Tabchi *et al*. on the etiologies of profound neurosensory deafness: 51.8% of genetic causes, 32.8% of acquired causes [19].

One positive aspect of the Lebanese culture, not quite found in the western developed nations, is that family (relatives and loved ones) is omnipresent. The disabled person is practically never unattended, especially in emergency settings and situations.

This can also explain the good control of chronic diseases like diabetes and arterial hypertension. Also, besides quality of care, cost and far locations, family presence explains underusing interpretation services. For instance, when information is not delivered or not well understood, the content could be explained by a family member and or a person of trust.

Although there is still no unified official LSL in Lebanon, the Lebanese Deaf use the sign language taught in their communities and specialized schools. In the current study, the LDP favor sign language as their communication preference (71%). This result meets that of the United Kingdom, where 93% of the DHH choose to communicate in sign language in clinical settings [20]. The satisfaction of the LDP with the interpreting services, when available, can be explained by the fact that most interpreters are delegated by the associations or schools to which they belonged.

4.2.3. Health of the Deaf

In terms of healthcare coverage, the LDP depends more on public insurance in comparison with the GLP (53% *versus* 29%), rarely benefit from both coverage systems (7% *versus* 26%), and some report not being allowed to be insured (3.5%). In Lebanon, where the healthcare system relies mainly on the private sector [6], the LDP numbers reflect the

financial difficulties and discrimination that they encounter.

The LDP appears to be healthier in terms of physical activity, arterial hypertension, diabetes (similar to the numbers found in the United Kingdom [11]), dyslipidemia and their control, obesity prevalence, as well as the number of emergency department visits during the past year. These findings could be related to the predominant young age in the sample and the protective omnipresence of the family. However, the discrepancy between the low level of reported emergency department use and the ongoing needed medical care that they report (because of cost and weak quality of care) reflects the ignorance, neglect and difficulty of their health situation.

When analyzing interpersonal violence, the LDP report a high rate of physical and psychological abuse (19% combined) with a 70% rate of unanswered questions.

Deaf respondents reported more depression (12 *versus* 5%) with a high rate of unanswered questions about suicide, more alcohol intake (50% *versus* 21%), but in terms of smoking, the numbers converged between both populations. High prevalence of depressive symptoms and such alcohol and tobacco consumption patterns are compatible with daily-life challenges that the LDP endures. The combination of the above-mentioned factors could explain the high rate (90%) of believers in the LDP, resorting to prayer for surpassing and soothing their problems.

Another risk factor to be highlighted is the lack of medical vocabulary. On one hand, we found that 78% of the LDP have no knowledge in medical terms, a reality that can explain the low numbers found when asked about medical primary prevention (Figure 9, C). On the other hand, in Lebanon, there exists a lack of appropriate sign language terminology, such as one study which reported that British Sign language does not have a sign for the word cholesterol [21].

Also, when assessing their medical knowledge about STDs, 74% of the LDP had no clue about it, whereas only 15% reported knowing HIV. At a regional level, the Middle East region has the lowest HIV prevalence in the world (0.1%) [18]. That could explain the null result of STD infections and the lack of awareness about the diseases.

In a survey of Deaf associations around the globe, only 41 countries reported that HIV/AIDS affects deaf people, whereas 52 country respondents said that HIV/AIDS does not affect deaf people in their countries [22]. These results suggest that there is a need for awareness and information campaigning directed not only at deaf individuals, but also for associations of the Deaf [22]: sex education, contraception, cancer screening, mammography, and routine check-ups.

Therefore, compared to the general hearing population, Deaf people are more vulnerable physically and mentally. They are little exposed to medical prevention campaigns (TV, radio, lack of health information and education materials provided in sign language) and more prone to psychological pathologies, especially depression and suicidal ideation for which the numbers are higher than those of the GLP with a net predominance of unanswered questions, out of fear of exposure and/or taboo.

In emergency settings, changes during urgent situations present a heavy challenge for deaf people and the treating personnel because Deaf individuals experience difficulties in obtaining and transmitting information. These difficulties often result in the dependency of the deaf person on others [23] and expose the need for adapted communication emergency material for rapid diagnosis and treatment, hence the need of sign language trained medical personnel and Lebanese-tailored visual material for optimal communication.

4.2.4. Discrimination & Misconceptions

Although taking part in social activities (94%), the LDP continue to face attitudinal and environmental barriers to participation in many areas of life. For instance, they report lower rates of marriage and number of children, and higher rates of divorce. This could be related to financial and communication difficulties.

LDP are more likely to be excluded from education and employment, as can be deduced from the low level of education, the nature of jobs - not indulging in team work nor social interaction – that they occupy (manual, craft, computer-based), as well as their low income in comparison with the GLP, thus affecting their access to healthcare and other services [24].

In a review of the literature, deaf populations show poor reading degrees, usually not exceeding elementary levels [24]. As this information remains under-spread, it leads to unpreparedness of materials and texts that use written language levels adapted to those of the Deaf [25].

Many of the Lebanese physicians are unaware of the Deaf culture and the health needs of deaf people as they may have a biologic basis for their hearing loss, leading to assumptions and misconceptions about deafness that undermine professional health care. For example, practitioners often believe that lip /speech reading and note writing provide effective health communication, whereas in reality, these are ineffective communication modalities for healthcare conversations [3, 7]. The Deaf favor sign language and only a few can manage to fully understand lip or speech reading,: 30-45% of spoken English [26], 25% of spoken French [27], and only 14% of the LDP can manage to read lips. For note-writing and/or reading, the problem resides in the initial language and vocabulary knowledge of the Deaf [28].

Sign language interpreters are understaffed at the national level and cannot accommodate all the requests, especially when they are not planned. As shown in the current study, another limitation is the incurred cost. There still is no unified LSL in Lebanon, a pretext for the Lebanese Health-payers not to cover interpreting costs.

Moreover, DHH people from the LDP who do not know sing-language and/or do not use other means of communication that are in common with the hearing society constitute a sub-population in the LDP that experiences even bigger inequities in terms of access to services, particularly, health communication, healthcare, health research, and health-related careers.

All the above problems can be summarized under the

umbrella of access: access to communication, information, education and culture, as well as access to services, including those related to health. Access to information is to be stressed on because it can help people with disabilities, the Deaf in particular, achieve their rights and participate, like others, in all activities and sectors of life. In Lebanon, in 2009, a law on access to information has been drafted. To date, it has not yet been adopted because of the political crisis still paralyzing the country [7].

4.3. Testimonials & Requests

4.3.1. Testimonials

The Lebanese Deaf and the respective associations are longing for enormous efforts from both the Government and the healthcare sector to assist them in their daily-life activities.

Although the practitioner's skills are not questioned, the doctor-patient relationship is tarnished by communication difficulties felt by the Deaf as harmful. When in need of medical care, the LDP expected from their physicians a better knowledge of deafness and its related handicaps. Additionally, they demand optimizing the means of communication, such as using sign language, favoring lip reading, written languages, as well as appointment making through adapted means (SMS, e-mails). The interviewed LDP members complained about the lack of time allocated for consultation with their doctors. For instance, in French care units for the deaf, the duration of the consultation is twice that of a general medical consultation: 31 minutes against 16 minutes [27]. Time accommodations could prevent misunderstandings about diagnosis and treatment methods and spare detrimental results.

As the population ages, the number of persons with hearing limitations will increase, and ensuring effective communication is essential to safe, timely, efficient, and patient-centered care. However, in the Lebanese healthcare setting, nor physicians neither the patients are reimbursed for making accommodations, like hiring sign language interpreters. The current study shows that professional interpreting, although largely acclaimed by deaf patients, is still little used. To achieve health equity for the deaf community, the training and credentialing of interpreters needs to be systematically addressed. It must however be facilitated by the medical staff because it is the ideal way to allow a satisfactory exchange without forcing one of the two interlocutors to provide additional effort to communicate [28]. This is a delicate matter because confidentiality is not preserved when a patient's relative or friend is solicited for communication.

4.3.2. Requests

The main requests of the Lebanese Deaf associations can be summarized under three points:

1) Awareness for the GLP: as the current study has shown, the LDP is treated mainly negatively by the general population, which can be attributed to ignorance and misunderstood facts concerning their disability (e.g.: Deafness is not equal to "stupidity" nor mental retardation, and it is definitely not a social exclusion factor).
2) Unify the LSL and make it official.
3) Government subvention for healthcare, especially medical coverage of hearing aid devices, related surgeries and interpreting services.

4.4.3. Law 220/2000

The Law 220/2000 is comprehensive and targets all sectors; it addresses the rights of people with disabilities to proper education, rehabilitation services, employment, medical services, sports and access to public transport and other facilities. It also stresses the right to participation.

Law 220/2000 stipulates that "The entire world has come to believe that every person, whatever his physical or intellectual capacities has the right to enjoy life on an equal basis with others". Yet, according to the 2013 UNESCO report, in Lebanon, most of the persons with disabilities are either without education and/or without employment. Furthermore, as shown in the results, the LDP are for the most of them unaware of the law. Many poor families with disabled children struggle to pay the medical and rehabilitative cost for their children. Based on MOSA statistics, 94.77% of the Lebanese disabled people (18 - 64 years old) are unemployed in 2012 [4], in contradiction with the rate of employment of 64% found in the current study. Nonetheless, their income is very low compared to that of the GLP, questioning the nature of jobs accessible by the LDP and reflecting the poverty that shapes the life of the disabled people in Lebanon.

Having assessed the law 220/2000 and inquiring the LDP and their associations about the reality of its application eighteen years after its promulgation, here is an objective summary of what has been achieved and not yet applicable on ground (Table 4).

4.3.4. Discrimination & Access to Services

Although prohibited by law, discrimination against persons with disabilities continued. For example, the law stipulates that at least 3 percent of all government and private sector positions be filled by persons with disabilities, provided such persons fulfill the qualifications for the position; however, no evidence indicated it was enforced [29]. The law mandates access to buildings (all types, public and private) by persons with disabilities, but the government failed to amend building codes [6, 29].

4.3.5. Education

In 2002, the Ministry of Education and Higher Education decreed that new school building construction should include all the necessary facilities to receive the physically challenged. Nonetheless, the public school system was ill equipped to accommodate students with disabilities (poor regulatory framework, poor infrastructure not accessible to persons with disabilities, curricula without adapted material to assist children with disabilities, laboratories lacking adapted equipment and space, teaching media and tools not accessible to students with disabilities including students

who were deaf, and lack of accessible transportation to and from schools) [29].

NGOs, some managed by religious entities, offered education and health services for children with disabilities. The MOSA contributed to the cost, although the ministry often delayed payments to the organizations [7, 29].

4.3.6. Political Life

In the 2009 elections, a Lebanese Physically Handicapped Union study showed only six of the country's 1,741 polling stations satisfying all criteria for accessibility [29], reflecting a persistent discrimination and social blockade of accessibility.

4.3.7. Healthcare

Concerning the LDP, earlier in May 2018, a proposition of law was presented to define the regulation of the various stages of cochlear implantation. However, besides the risks of surgery itself, surgical procedures to place the cochlear implant are performed in most cases without psychological preparation of the child and his family, and without collaboration with the multidisciplinary team (psychologist, speech therapist) supposed to prepare and follow the child after the operation; hence the need for such a law in Lebanon [30].

4.4. Future Perspectives & Recommendations

After conducting our study, many lessons have been learnt, from which we present recommendations and future perspectives to be considered for the well-being of the LDP.

1) Unify the LSL and make it official, to be applicable in public and private sectors.
2) Implicate professionals from all Lebanese sectors to contribute in the development of the LSL and dissolve all technical language barriers.
3) Apply all articles of Law 220/2000, reform it in healthcare consultations with all relevant stakeholders, adopt legislation strategies ensuring the right to information for patients subjected to voluntary and involuntary medical and or legal services, and educate the GLP about it.
4) Raise awareness to promote hearing care and reduce stigma.
5) Ensure that government budgets give a clear account of expenditure on disability.
6) Ensure that government information is accessible in a range of formats responding to the diverse needs of people with disabilities, including sign language, and make sure that concerned authorities remove obstacles to access preventing people with disabilities from participating fully in everyday life activities.
7) Create cultural, social, medical and legal competence training programs for healthcare and government professionals, as well as students throughout their education and professional curricula. Medical school training regarding methods to improve diagnosis and treatment of patients with communicative impairments [10] is highly needed.
8) Identify the DHH population, inform and include them in their rights exercise and protection by sharing with them the debates and research projects invested in their favor.
9) Encourage deaf sign language users to participate in public health, health research, and healthcare.
10) Provide qualified interpreters and other assistive devices to patients who are deaf or hard of hearing. This is a double-edged sword because removing communication barriers can protect, not only the DHH people, but also healthcare providers from potential legal actions [31].
11) In all kinds of one-on-one settings, minimize the number of documents submitted and rephrase what the patient understood.
12) Strengthen maternal and child healthcare programs including immunization.
13) Implement infant and school-based hearing screenings. In fact, in 1971, a study on school children living in Beirut showed that 5.2% of them had impaired hearing, and that this proportion more than doubled where additional otoscopy was performed [32].
14) Make hearing devices and communication therapies accessible.
15) Regulate and monitor the use of ototoxic medicines and environmental noise, and spread awareness regarding congenital and early childhood accidents impairing hearing.
16) Ensure that accurate, reliable and comprehensive information and data about disabilities and the full achievement of human rights by people with disabilities are collected on a regular basis and maintained in an organized and systematic manner, available for the public [24].
17) Make video-based information and medical prevention campaigns public in the purpose of health and law education.
18) Develop routine preventative health check-ups culture.
19) Create health centers for the Deaf that are attached to general hospitals and provide complete access to healthcare by competent staff who are familiar with the LDP needs and able to communicate in LSL and or other modes according to the need of their patients [33].
20) Implement dedicated ambulatory services for primary healthcare for the Deaf [34].
21) Allow texting communication with regular phones. This technology enables deaf people to make initial contact by telephone (through voiced text messages) and continue any conversation by SMS [24].
22) Allow the use of email to reach any Lebanese sector, for making appointments or asking short questions.
23) As found in our sample, besides traditional means of communication, the LDP also use the internet and mobile applications for communication, and that via video recording and typing. Such an alternative service

can be imagined or developed for interpreting purposes and could be of utmost utility for the most isolated deaf patients, and when unexpected appointments are needed. Telemedicine can provide wide reaching access to resource centers, offering web communication with signing experts.

24) The development and distribution of a sign language recognition system that translate signs made by smart gloves worn by the DHH individuals [35].

5. Conclusion

Community-engaged research with deaf populations highlights strengths and disadvantages, providing crucial data otherwise missing from existing public health surveillance. Such projects are necessary to learn about the specific features of deaf identity and culture in order to facilitate communication abilities and relationships between deaf people and society, and form foundations for active inclusion of deaf communities. In Lebanon, there is no data registered about the LDP. Our study is the first of its kind to reflect the realities gravitating around hearing impairment in Lebanon.

In comparison with the GLP, deaf adults in Lebanon live in poorer socioeconomic conditions, have lower literacy levels and have limited access to information. And since healthcare access has been proven to affect the health of deaf people [36], there are still no data in Lebanon concerning their health status. Globally, deaf people's health is poorer than that of the general population, with probable underdiagnoses and under-treatment putting them at risk of preventable ill health. However, in Lebanon, the results found were divergent from the expected ones: the LDP appears to be healthier than the GLP, with chronic disease prevalence still unknown. A selection bias may be the reason behind this discrepancy, but the fact that the main schools and associations for the deaf covering the whole Lebanese territory were selected reduced the probability of such a bias. Yet, concerning mental health problems, such as depression and suicidal ideation, it appears to be greater than that of the general population. In terms of social and legal aspects of their daily-life, the latter is still filled with discrimination and access blockage.

The aim of this original study is to assess the current situation of a representative sample of the Deaf community in Lebanon, to compare it with that of the general population, expose the gaps they encounter on a daily-basis, and propose perspectives for enhancing their life conditions. More research is needed to include a wider number of Deaf, as well as the under-represented ranges of age and the subpopulations that couldn't be reached via the associations.

List of Abbreviations

WFD: World Federation for the Deaf
LSL: Lebanese Sign Language
LDP: Lebanese Deaf Population
GLP: General Lebanese Population
HH: Hard-of-Hearing
DHH: Deaf and Hard-of-Hearing
MOSA: Ministry of Social Affairs
WHO: World Health Organization
STDs: Sexually Transmitted Diseases
HIV: Human Immunodeficiency Virus
AIDS: Acquired Immunodeficiency Syndrome
CI: confidence interval

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