

Policy Brief

Mandating Newborn Hearing Screening in Lebanon



K2P Policy Briefs bring together global research evidence, local evidence and context-specific knowledge to inform deliberations about health policies and programmes. It is prepared by synthesizing and contextualizing the best available evidence about the problem and viable solutions through the involvement of content experts, policymakers and stakeholders.

+ Included



Description of a health
System problem



Visible options
for addressing this
problem



Strategies for
implementing these
options

× Not Included



Does not make
recommendations

Authors

Yara El Kawsy, George Zaytoun, Ola El Zein, Diana Jamal, Fadi El-Jardali

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Merit Review

The K2P Policy Brief undergoes a merit review process. Reviewers assess the brief based on merit review guidelines.

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Key Messages

Purpose

The purpose of this Policy Brief is to highlight the importance of early identification and intervention for hearing loss in newborns while emphasizing the different consequences that result from inaction. The brief also aims to suggest options to address the issue and possible implementation barriers and counterstrategies.

Problem

According to the Lebanese Ministry of Public Health (MOPH), the economic burden of late identification and management of hearing loss in Lebanon is estimated to be \$300 million annually (MOPH, 2018). Many children do not receive intervention on time as they did not have newborn hearing screening done for them, this causes them to have delayed communication skills, affecting their level of education, and resulting in social and psychological problems (Yoshinaga-Itano, Sedey, Coulter, Albert, and Mehl, 1998).

What do we know about the four options of an approach to addressing the problem?

Option 1> Mandate newborn hearing screening in Lebanon and develop national guidelines on early hearing loss identification and unify practices across different institutions.

Option 2> Increase awareness of parents and the different stakeholders involved.

Option 3> Utilize data collected to develop prevalence studies in order to understand and quantify the magnitude of the problem in Lebanon.

Option 4> Recruit more of the currently available audiologists in healthcare institutions so that they can train other healthcare providers and increase their awareness while providing regular monitoring for the screening process.

What implementation considerations need to be kept in mind?

- Newborns might leave the hospital before having their hearing screened.
- Some organizations might lose follow up on newborns who did not pass the screening.
- Funding might be insufficient to subsidize hearing screening programs.
- There is a possibility that some relevant key stakeholders might not be motivated to act on the issue, especially because hearing loss could often be a hidden disability.

الرسائل الرئيسية

الغاية

الغرض من موجز السياسة هذا هو تسليط الضوء على أهمية التحديد والتدخل المبكر لفقدان السمع عند الأطفال حديثي الولادة مع التأكيد على العواقب المختلفة التي تنجم عن عدم اتخاذ أي إجراء. ويهدف الموجز أيضًا إلى اقتراح عناصر لمعالجة المشكلة والعوائق والاستراتيجيات المضادة المحتملة للتنفيذ.

المشكلة

وفقًا لوزارة الصحة العامة اللبنانية، يُقدر العبء الاقتصادي للتشخيص المتأخر لضعف السمع وإدارته في لبنان بحوالي 300 مليون دولار سنويًا (وزارة الصحة العامة، 2018). لا يتلقى العديد من الأطفال التدخل في الوقت المحدد حيث لم يتم إجراء فحص سمع حديثي الولادة لهم، مما يتسبب في تأخرهم في مهارات التواصل، مما يؤثر على مستوى تعليمهم، ويؤدي إلى مشاكل اجتماعية ونفسية (يوشيناغا - إيتانو ، سيدي ، كولتر ، ألبرت وميهل ، 1998).

ماذا نعرف عن العناصر الأربعة لنهج لمعالجة المشكلة؟

- العنصر 1 < فرض فحص سمع حديثي الولادة في لبنان ووضع مبادئ توجيهية وطنية لتحديد فقدان السمع المبكر وتوحيد الممارسات عبر المؤسسات المختلفة.
- العنصر 2 < زيادة وعي أولياء الأمور وأصحاب المصلحة المختلفين المعنيين.

- العنصر 3 < استخدام البيانات التي تم جمعها لتطوير دراسات الانتشار من أجل فهم وتحديد حجم المشكلة في لبنان.

- العنصر 4 < تعيين المزيد من أخصائي السمع الموجودين حاليًا في مؤسسات الرعاية الصحية حتى يتمكنوا من تدريب مقدمي الرعاية الصحية الآخرين وزيادة وعيهم مع توفير المراقبة المنتظمة لعملية الفحص.

ما هي اعتبارات التنفيذ التي يجب مراعاتها؟

- قد يغادر الأطفال حديثي الولادة المستشفى قبل كشف سمعهم.
- قد تفقد بعض المنظمات متابعة حديثي الولادة الذين لم يجتازوا الكشف.
- قد يكون التمويل غير كافٍ لدعم برامج كشف السمع.
- هناك احتمال أن بعض أصحاب المصلحة الرئيسيين ذوي الصلة قد لا يكون لديهم الدافع للتصرف بشأن هذه المشكلة، لا سيما لأن ضعف السمع قد يكون في كثير من الأحيان إعاقة خفية

K2P Policy Brief

The Problem

Late identification and management of hearing loss in Lebanon has serious consequences for the Lebanese healthcare system. According to the MOPH, the economic burden of late identification and management of hearing loss is estimated to be \$300,000,000 annually (MOPH, 2010). The exact method through which the calculation of this financial loss was not shared by the MOPH, however, the former Minister has explained that this loss is due to funding for additional accommodations that otherwise would have not been needed. The low rates of screening can lead to inaccurate estimation of the local prevalence of congenital hearing loss needed for adequate resources allocation for adequate and timely management of hearing loss. A noteworthy audiology study showed that hearing-impaired pediatrics who had their hearing loss managed before the age of six months met speech milestones of their age regardless of how severe their hearing loss was; on the other hand, those who had an intervention after the age of six months had low language scores that decreased as the degree of the hearing loss was more severe (Yoshinaga-Itano, 1998). However, many children do not receive hearing loss management on time as they did not have newborn hearing screening done for them. This causes the baby to have delayed communication skills, affecting his/her level of education, and resulting in social and psychological problems (Yoshinaga-Itano, 1998). The absence of mandatory screening would lead to further increase in the financial burdens mentioned in addition to the increase of handicap

Background to Policy Brief

A K2P Policy Brief brings together global research evidence, local evidence, and context-specific knowledge to inform deliberations about health policies and programs. It is prepared by synthesizing and contextualizing the best available evidence about the problem and viable solutions and options through the involvement of content experts, policymakers and stakeholders.

The preparation of the Policy Brief involved the following steps:

- 1) Selecting a priority topic according to K2P criteria
- 2) Selecting a working team who deliberates to develop an outline for the policy brief and oversee the litmus testing phase.
- 3) Developing and refining the outline, particularly the framing of the problem and the viable options
- 4) Litmus testing by conducting one to one interviews with up to 15 selected policymakers and stakeholders to frame the problem and make sure all aspects are addressed.
- 5) Identifying, appraising and synthesizing relevant research evidence about the problem, options, and implementation considerations
- 6) Drafting the brief in such a way as to present concisely and in accessible language the global and local research evidence.
- 7) Undergoing merit review
- 8) Finalizing the Policy Brief based on the input of merit reviewers, translating into Arabic, validating translation, and disseminating through policy dialogues and other mechanisms.

in the country. If the screening is not done before the age of 1 month, appropriate intervention would not happen before the age of six months. This causes the baby to have delayed communication skills, affecting his/her level of education, and resulting in social and psychological problems. When unmanaged, hearing loss could lead to a significant financial loss. According to the WHO (2021), this loss is around \$980 billion worldwide every year. This also increases the burden on the health sector and the sectors involved in the process of providing the needed accommodations.

Size of the Problem

To date, no studies have addressed the determinants of congenital hearing loss in Lebanon. However, Lebanon shares similar characteristics with some countries in the Middle East and North Africa (MENA) region who have already identified congenital hearing loss risk factors. One of the identified risk factors is consanguinity which is the marriage of relatives (JCIH, 2019). Another factor is ototoxicity or medication that harms the auditory system (JCIH, 2019). During the key informant interviews that were conducted for the purpose of this policy brief, several stakeholders highlighted a lack of awareness on newborn screening and the importance of intervening before the age of six months among both healthcare care providers and the general public. Despite the importance of newborn hearing screening, there is no action plan implemented to ensure sufficient reach of screening services across Lebanon. According to 3 systematic reviews, newborn hearing screening has proven to produce better educational outcomes on the long term in addition to being cost-effective. This is due to the fact that less accommodations would be needed for the child to meet his/her speech and language milestones on time (Alshhawi, 2019; Nelson, 2008; Yoshinaga-Itano, Manchaiah, and Hunnicutt, 2021). Financially speaking, the former minister of Public Health estimated the loss for not screening early to be \$300 million annually (MOPH, 2018). However, there is no data on how this number was precisely calculated. It is only known that these economic consequences are a result of handicap and needed accommodations for the deaf, but the financial burden caused by each was not publicly shared.

Underlying factors

Governance Level

During the key informant interviews, several stakeholders highlighted the absence of national guidelines on the practice of newborn hearing screening in Lebanon that can unify the practice across the different healthcare institutions that provide hearing screening. There are currently two types of newborn hearing screenings in Lebanon: Otoacoustic Emissions (OAE) and Automated Auditory Brainstem Response (AABR). All babies can be screened with OAEs which are less costly than AABRs; however, OAEs have higher false positive rates than AABRs. Thus, having all babies screened with OAEs would require more diagnostic testing which is more expensive than AABRs.

Financing

Due to the lack of newborn hearing screening in Lebanon, interventions to address hearing loss usually happen at a late stage at which the child would have already missed acquiring key speech and language milestones. Consequently, additional accommodations would be required to address the issue which in turn increases the economic burden. These economic consequences are further exacerbated by the dire economic situation in the country which underscores the importance of early identification of hearing loss and early intervention.

Delivery

The Lebanese Pediatric Society has collaborated with the MOPH to provide 4 hospitals in different areas in Lebanon with OAE screening machines (Abou Samra, Soueidan, Hilal., and El-Jardali, 2018). Moreover, there are less than 50 audiologists in Lebanon which makes the issue of screening all babies locally even harder due to the lack of trained healthcare professionals who can safely perform the screening and follow up with the baby if needed. It is not clear if the number of audiologists in Lebanon will increase any time soon

due to the closure of the only audiology program in Lebanon in 2022.

Sociocultural

Since there are no studies that address the sociocultural determinants for the lack of newborn hearing screening in Lebanon, it might be beneficial to rely on information from countries that share similar characteristics with Lebanon to predict the sociocultural factors that might possibly exist in Lebanon. For instance, studies from Sweden, India, and some African countries have shown that the most common sociocultural factors include lack of awareness, negative attitude towards the screening technique, and stigma of having a deaf child (Hergils and Hergils, 2000; Garg et al., 2011; Oulsany et al., 2006; Ravi et al., 2016).

Policy Options and Implementation considerations

Based on evidence and taking the Lebanese context into consideration, the following options were developed. These options are not mutually exclusive. Thus, one or more could be implemented together.

Option 1> Mandate newborn hearing screening in Lebanon and develop national guidelines on early hearing loss identification and unify practices across different institutions.

Option 2> Increase awareness of parents and the different stakeholders involved.

Option 3> Utilize data collected to develop prevalence studies in order to understand and quantify the magnitude of the problem in Lebanon.

Option 4> Recruit more of the currently available audiologists in healthcare institutions so that they can train other healthcare providers and increase their awareness while providing regular monitoring for the screening process.

Implementation considerations

On the **patient level**, newborns leaving the hospital before having their hearing screened (Skrinska., Khneisser., Schielen, and Loeber, 2020). This could be addressed by increasing surveillance of newborn screening during postpartum neonatal visits (Skrinska et al., 2020).

On the **organization level**, there might be a loss of follow up on newborns who got a “refer” result (Mumtaz, Babur, and Saqulain, 2019; Naidoo and Khan, 2022; Cavalcanti et al., 2014). This could be addressed by:

- a) Developing and utilizing a management information system that tracks screening and follow up results (Mumtaz, Babur and Saqulain, 2019; Naidoo and Khan, 2022).
- b) Enhancing coordination across healthcare providers (including involving medical staff, nurses, social workers, and speech therapists), government, and the society (Cavalcanti et al., 2014). Integrate newborn hearing screening with other neonatal screening programs or growth monitoring programs (Cavalcanti et al., 2014).

On the **system level**, there might be insufficient funding to subsidize hearing screening (United Nations, 2007). Adding hearing screening to covered child healthcare service packages such as those of routine vaccinations could be a way to provide funding (Cavalcanti et al., 2014; United Nations, 2007). Additionally, some relevant key stakeholders might not be motivated to act on the issue, especially because hearing loss could often be a hidden disability (Mumtaz, Babur and Saqulain, 2019). Therefore, all relevant key stakeholders should be educated on the effectiveness of early detection of hearing loss and early intervention by highlighting its effectiveness from existing known cases using media (Mumtaz, Babur and Saqulain, 2019).

المشكلة

الكشف المتأخر عن فقدان السمع وإدارته في لبنان له عواقب وخيمة على نظام الرعاية الصحية اللبناني. وفقًا لوزارة الصحة العامة، يُقدر العبء الاقتصادي للتأخر في تحديد وإدارة فقدان السمع بحوالي 300 مليون دولار سنويًا (وزارة الصحة العامة ، 2010). الطريقة الدقيقة التي لم يتم من خلالها احتساب هذه الخسارة المالية من قبل وزارة الصحة العامة، ومع ذلك، أوضح الوزير السابق أن هذه الخسارة ناتجة عن تمويل تسهيلات إضافية لم تكن هناك حاجة إليها لولا ذلك. يمكن أن تؤدي المعدلات المنخفضة للكشف إلى تقدير غير دقيق للانتشار المحلي لفقدان السمع الخلقي اللازم لتخصيص الموارد الكافية للإدارة الملائمة وفي الوقت المناسب لفقدان السمع. أظهرت دراسة سمعية جديدة بالملاحظة أن الأطفال الذين يعانون من ضعف السمع والذين عانوا من ضعف سمعهم قبل سن ستة أشهر قد حققوا مراحل النطق الخاصة بأعمارهم بغض النظر عن مدى شدة فقدان السمع لديهم؛ من ناحية أخرى، كان لدى أولئك الذين خضعوا للتدخل بعد سن ستة أشهر درجات لغوية منخفضة انخفضت حيث كانت درجة ضعف السمع أكثر حدة (Yoshinaga-Itano ، 1998). ومع ذلك، لا يتلقى العديد من الأطفال إدارة فقدان السمع في الوقت المحدد حيث لم يتم إجراء كشف سمع حديثي الولادة لهم. يؤدي هذا إلى تأخر مهارات الاتصال لدى الطفل، مما يؤثر على مستواه التعليمي، ويؤدي إلى مشاكل اجتماعية ونفسية (Yoshinaga-Itano ، 1998). (سيؤدي غياب الكشف الإلزامي إلى زيادة الأعباء المالية المذكورة بالإضافة إلى زيادة الإعاقة في الدولة. إذا لم يتم إجراء الكشف قبل سن شهر واحد، فلن يحدث التدخل المناسب قبل سن ستة أشهر. يؤدي هذا إلى تأخر مهارات الاتصال لدى الطفل، مما يؤثر على مستواه التعليمي ، ويؤدي إلى مشاكل اجتماعية ونفسية. عندما لا يتم التحكم في فقدان السمع، يمكن أن يؤدي إلى خسارة مالية كبيرة. وفقًا لمنظمة الصحة العالمية (2021) ، تبلغ هذه الخسارة حوالي 980 مليار دولار في جميع أنحاء العالم كل عام. كما أن هذا يزيد

العبء على القطاع الصحي والقطاعات المشاركة في عملية توفير التسهيلات اللازمة.

حجم المشكلة

حتى الآن، لم تتناول أي دراسات محددات ضعف السمع الخلقي في لبنان. ومع ذلك، يشترك لبنان في خصائص مماثلة مع بعض البلدان في منطقة الشرق الأوسط وشمال أفريقيا (MENA) التي حددت بالفعل عوامل خطر الإصابة بفقدان السمع الخلقي. أحد عوامل الخطر التي تم تحديدها هو القرابة وهو زواج الأقارب (JCIH)، (عامل آخر هو السمية الأذنية أو الأدوية التي تضر بالجهاز السمعي JCIH)، (2019). خلال مقابلات المخبرين الرئيسية التي أجريت لغرض موجز السياسة هذا، سلط العديد من أصحاب المصلحة الضوء على نقص الوعي بكشف حديثي الولادة وأهمية التدخل قبل سن ستة أشهر بين كل من مقدمي الرعاية الصحية وعامة الناس. على الرغم من أهمية كشف سمع حديثي الولادة، لا توجد خطة عمل مطبقة لضمان الوصول الكافي لخدمات الكشف في جميع أنحاء لبنان. وفقاً لثلاث مراجعات منهجية، أثبت كشف سمع حديثي الولادة أنه ينتج نتائج تعليمية أفضل على المدى الطويل بالإضافة إلى كونه فعالاً من حيث التكلفة. ويرجع ذلك إلى حقيقة أن الطفل قد يحتاج إلى تسهيلات أقل للوفاء بكلامه / ها ومعالم لغته في الوقت المحدد (الشهاوي، 2019؛ نيلسون، 2008؛ يوشيناغا-إيتانو، مانشايا، وهونيكوت، 2021). من الناحية المالية، قدّر وزير الصحة العامة السابق خسارة عدم الكشف المبكر بحوالي 300 مليون دولار سنوياً (وزارة الصحة العامة، 2018). ومع ذلك، لا توجد بيانات حول كيفية حساب هذا الرقم بدقة. من المعروف فقط أن هذه العواقب الاقتصادية هي نتيجة الإعاقة والتجهيزات اللازمة للصم، لكن العبء المالي الناجم عن كل منها لم يتم تقاسمه علناً

العوامل المسببة مستوى الحكومة

خلال المقابلات مع المخبرين الرئيسيين، سلط العديد من أصحاب المصلحة الضوء على عدم وجود إرشادات وطنية حول ممارسة كشف سمع حديثي الولادة في لبنان والتي يمكن أن توحد هذه الممارسة عبر مؤسسات الرعاية الصحية المختلفة التي توفر كشف السمع. يوجد حاليًا نوعان من فحوصات سمع حديثي الولادة في لبنان: الانبعاثات الصوتية (OAE) والاستجابة التلقائية لجذع الدماغ السمعي (AABR). يمكن كشف جميع الأطفال باستخدام OAEs الأقل تكلفة من AABR ؛ ومع ذلك ، فإن OAEs لديها معدلات إيجابية كاذبة أعلى من AABRs. وبالتالي، فإن كشف جميع الأطفال باستخدام OAE سيتطلب المزيد من الاختبارات التشخيصية التي تكون أكثر تكلفة من AABRs.

المستوى الاقتصادي

بسبب عدم وجود كشف سمع حديثي الولادة في لبنان، عادة ما تحدث التدخلات لمعالجة ضعف السمع في مرحلة متأخرة يكون فيها الطفل قد فاتته بالفعل اكتساب معالم الكلام واللغة الرئيسية. وبالتالي، ستكون هناك حاجة إلى تسهيلات إضافية لمعالجة المشكلة التي تؤدي بدورها إلى زيادة العبء الاقتصادي. تتفاقم هذه العواقب الاقتصادية بسبب الوضع الاقتصادي المزري في البلاد والذي يؤكد أهمية التحديد المبكر لفقدان السمع والتدخل المبكر.

مستوى تقديم الخدمات

تعاونت جمعية طب الأطفال اللبنانية مع وزارة الصحة العامة لتزويد 4 مستشفيات في مناطق مختلفة في لبنان بأجهزة كشف OAE (أبو سمرة ، سويدان ، هلال ، والجردي ، 2018). علاوة على ذلك ، يوجد أقل من 50 أخصائي سمعيات في لبنان

مما يجعل مسألة كشف جميع الأطفال محليًا أكثر صعوبة بسبب نقص المتخصصين في الرعاية الصحية المدربين الذين يمكنهم إجراء الكشف والمتابعة بأمان مع الطفل إذا لزم الأمر. ليس من الواضح ما إذا كان عدد أخصائي السمعيات في لبنان سيرتفع في أي وقت قريب بسبب إغلاق برنامج السمعيات الوحيد في لبنان في عام 2022.

نظرًا لعدم وجود دراسات تتناول المحددات الاجتماعية والثقافية لنقص كشف سمع الأطفال حديثي الولادة في لبنان ، فقد يكون من المفيد الاعتماد على معلومات من البلدان التي لها نفس الخصائص مع لبنان للتنبؤ بالعوامل الاجتماعية والثقافية التي قد تكون موجودة في لبنان. على سبيل المثال ، أظهرت دراسات من السويد والهند وبعض البلدان الأفريقية أن أكثر العوامل الاجتماعية والثقافية شيوعًا تشمل نقص الوعي والموقف السلبي تجاه تقنية الكشف ووصمة إنجاب طفل أصم (Hergils and Hergils، 2000 ؛ Garg et al. ، 2011 ؛ Oulsany et al. ، 2006 ؛ Ravi ، et al. ، 2016).

عناصر السياسة واعتبارات التنفيذ

- بناءً على الأدلة ومع أخذ السياق اللبناني بعين الاعتبار، تم تطوير الخيارات التالية. هذه الخيارات ليست متعارضة. وبالتالي، يمكن تنفيذ واحد أو أكثر معًا.
- ← العنصر 1 < فرض كشف سمع حديثي الولادة في لبنان ووضع مبادئ توجيهية وطنية لتحديد فقدان السمع المبكر وتوحيد الممارسات عبر المؤسسات المختلفة.
 - ← العنصر 2 < زيادة وعي أولياء الأمور وأصحاب المصلحة المختلفين المعنيين.
 - ← العنصر 3 < استخدام البيانات التي تم جمعها لتطوير دراسات الانتشار من أجل فهم وتحديد حجم المشكلة في لبنان.
 - ← العنصر 4 < تعيين المزيد من أخصائي السمع الموجودين حاليًا في مؤسسات الرعاية الصحية حتى يتمكنوا من تدريب مقدمي الرعاية الصحية الآخرين وزيادة وعيهم مع توفير المراقبة المنتظمة لعملية الكشف.

اعتبارات التنفيذ

على مستوى المريض ، يغادر الأطفال حديثي الولادة المستشفى قبل كشف سمعهم (Skrinska. 2020).

على مستوى المؤسسة، قد تكون هناك خسارة في متابعة المواليد الجدد الذين حصلوا على نتيجة "إحالة" (ممتاز، بabor، وساقلين ، 2019 ؛ نايدو وخان ، 2022 ؛ كافالكاني وآخرون ، 2014). يمكن معالجة ذلك بواسطة:

أ. تطوير واستخدام نظام المعلومات الإدارية الذي يتتبع نتائج الفرز ومتابعة (ممتاز ، بabor وساقلين ، 2019 ؛ نايدو وخان ، 2022).

ب. تعزيز التنسيق بين مقدمي الرعاية الصحية (بما في ذلك إشراك الطاقم الطبي والممرضات والأخصائيين الاجتماعيين ومعالجي النطق) والحكومة والمجتمع (Cavalcanti et al., 2014). دمج كشف سمع حديثي الولادة مع برامج كشف حديثي الولادة الأخرى أو برامج مراقبة النمو (Cavalcanti et al., 2014).

على مستوى النظام الصحي، قد يكون هناك تمويل غير كاف لدعم كشف السمع (الأمم المتحدة ، 2007). يمكن أن تكون إضافة كشف السمع إلى حزم خدمات الرعاية الصحية للأطفال المغطاة مثل التطعيمات الروتينية وسيلة لتوفير التمويل (Cavalcanti et al., 2014؛ United Nations ، 2007). بالإضافة إلى ذلك ، قد لا يكون بعض أصحاب المصلحة الرئيسيين ذوي الصلة متحمسين للعمل بشأن هذه المشكلة ، خاصة وأن ضعف السمع قد يكون في كثير من الأحيان إعاقة خفية (ممتاز ، بabor وساقلين ، 2019). لذلك ، يجب تثقيف جميع أصحاب المصلحة الرئيسيين ذوي الصلة حول فعالية الاكتشاف المبكر لفقدان السمع والتدخل المبكر من خلال تسليط الضوء على فعاليته من الحالات المعروفة الحالية باستخدام وسائل الإعلام (ممتاز ، بabor وساقلين ، 2019).

K2P Policy Brief-

Full report

The Problem

Late identification and management of hearing loss in Lebanon has serious consequences for the Lebanese healthcare system. Financially speaking, the economic burden resulting from late management of hearing loss can be around \$300 million annually due to the need of additional disability accommodations (MOPH, 2018). According to a systematic review for 17 Arab countries, estimates of genetic hearing loss ranged from 1.2 to 18 per 1,000 newborns (Sidenna, Fadl, and Zayid, 2020). The magnitude of the problem is still unknown in Lebanon which flags the need for newborn hearing screening. Many children do not receive intervention on time as they did not have newborn hearing screening done for them. Late interventions may cause delayed communication skills in children, affecting their level of education, and resulting in social and psychological problems (Yoshinaga-Itano, 1998).

Size of the Problem

National Level

The first 6 months of life are crucial for acquiring speech and language skills (Yoshinaga et al., 1998). If the auditory part of the brain is not stimulated during early childhood years, a process of “neural pruning” occurs where other senses would take over the unused auditory sense early on. This makes acquiring speech and language skills at later stages very challenging (Yoshinaga-Itano, 1998).

To date, no studies have addressed the determinants of congenital hearing loss in Lebanon. However, Lebanon shares similar characteristics with some countries in the MENA region who have

already identified congenital hearing loss risk factors. One of the identified risk factors is consanguinity (JCIH, 2019). “Consanguinity” or the marriage of relatives increases the risk of several diseases including genetic hearing loss. Generally speaking, having any disease or syndrome at birth and low birth weight are some of the signs that a newborn might have hearing loss. Harmful pregnancy practices by the mother, such as alcohol consumption or noise exposure can be risk factors for congenital hearing loss, with the former possibly leading to a whole spectrum of disorders known as Fetal Alcohol Spectrum Disorder (JCIH, 2019). Having an imaging procedure can also have side effects on the fetus’s hearing. These pregnancy practices are not fully preventable as sometimes mothers are not aware that they are pregnant during the early stages of pregnancy. According to a systematic review by Vos et al. (2021), cytomegalovirus was found to be a major risk factor for congenital and late onset hearing loss (2021). Another systemic review by Vasoncellos et al. (2014) depicted several risk factors for hearing loss in children including belonging to a family of low socioeconomic status and having parents who are manual laborers. According to the interviewed stakeholders, all these risk factors are prevalent in Lebanon. Additionally, there is lack of awareness on newborn hearing screening and importance of intervening before the age of six months among both healthcare providers, parents, and the general public. Despite the importance of newborn hearing screening, there is no action plan implemented to ensure sufficient reach of screening services across Lebanon.

In July 2018, the MOPH launched a newborn hearing screening campaign, in collaboration with some public and private hospitals. The campaign had the slogan “لتعالجوا طفلكم بلا تأخير، فحصوه لسعوه عبكير” (To treat your baby without delays, screen his hearing early) (MOPH, 2018). The aim of the campaign was to raise awareness regarding the importance of early newborn hearing screening and to provide the screening for reduced prices in the private collaborating hospitals and for free in the public ones for a period of one month. The campaign was advertised on Lebanese TV channels. During the launching ceremony of the campaign, the former minister of Public Health indicated that the financial loss for not screening early mounts to \$300 million annually. However,

there is no information on how this number was obtained. Following this campaign, no reporting of progress was done and no new national/community-level campaigns were conducted, and screening is still not mandatory in Lebanon.

Regional Level

In 2016, the Saudi Ministry of Health implemented a national screening strategy; however, this strategy did not identify a specific hearing screening (Alshawi, 2019). Additionally, a noteworthy study by Alsulaiman (2013), showed that mothers in Saudi Arabia have high positive attitudes towards pregnancy termination when a genetic screening for hearing loss shows a positive result .

Global Level

It is estimated that 2 per 1000 babies are born with permanent hearing loss worldwide (WHO, 2021). However, it is not possible to compare this global prevalence rate to the prevalence rate in Lebanon due to the absence of studies that estimate the rate of hearing loss among newborns in Lebanon. According to a study by Huang et al., (2012), some areas in China implement universal newborn hearing screening whereby all newborns should have a hearing screening at birth and are entitled insurance coverage for the screening. In other areas, however, the screening services are available but not mandatory. In Nigeria, universal newborn hearing screening is conducted in community-based health centers whereas targeted screening (based on risk factor) is conducted in hospitals (Oulsanya, 2009). A study comparing both approaches concluded that community-based universal newborn hearing screening was proven to be the more cost-effective. The study showed that universal newborn hearing screening costed only \$7.62 as compared to \$73.24 for hospital-targeted screening (Oulsanya, 2009). In Germany, newborn hearing screening is mandatory (Langer, 2012). Yet, the concern is to have a proper follow up system to make sure that babies with hearing loss do not miss out on early intervention (JCIH, 2019). According to a systematic review by Ravi et al (2016), more than 50% of mothers in the United States (US) and Malaysia lacked the awareness regarding the importance

of early hearing loss detection and intervention and the overall idea of screening. In the US, where hearing loss is the 2nd most prevalent disease in newborns, there are only 2 mandatory newborn screenings and universal hearing screening is one of them (University of Colorado Boulder, 2018.)

A noteworthy audiology study showed that hearing-impaired pediatrics who had their hearing loss managed before the age of six months met speech milestones of their age regardless of how severe their hearing loss was; on the other hand, those who had an intervention after the age of six months had low language scores that decreased as the degree of the hearing loss was more severe (Figure 1) (Yoshinaga-Itano, 1998).

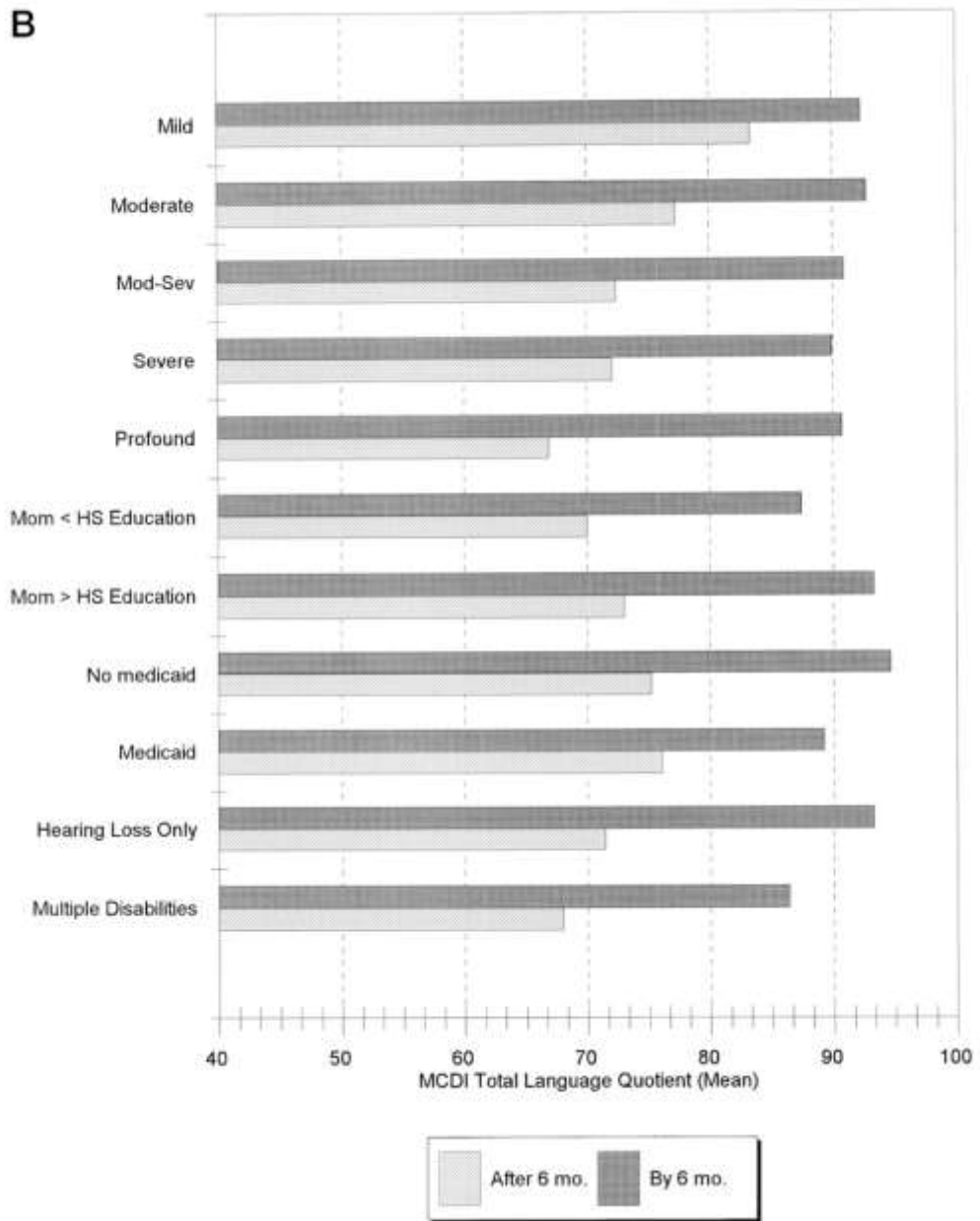


Figure 1. Showing the relation between early intervention and language quotient (Yoshinaga-Itano, 1998).

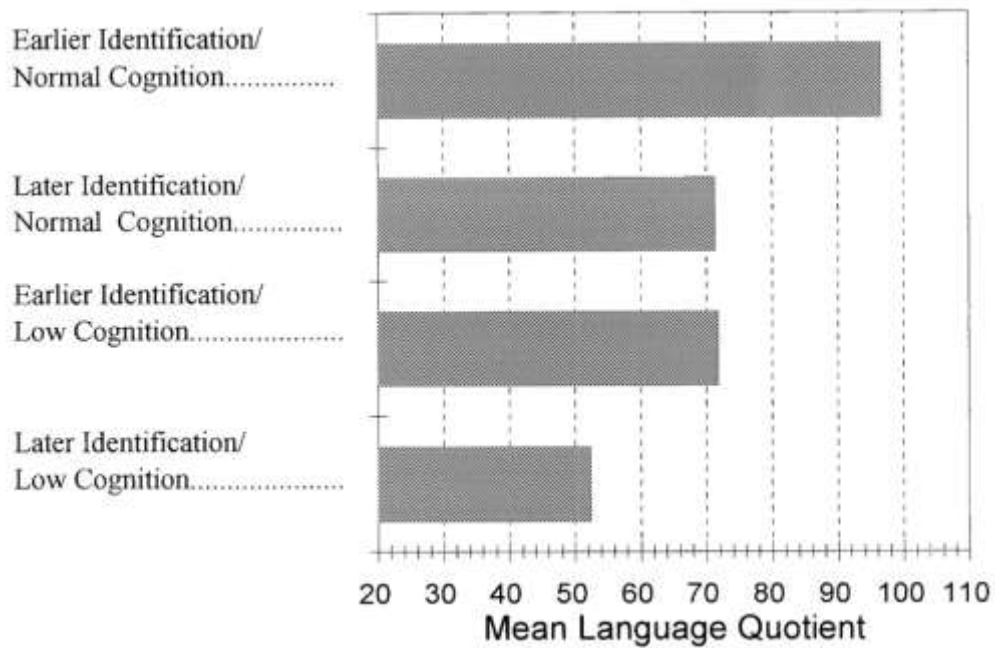


Figure 2. The similarity between the effect of late identification and low cognition (Yoshinaga-Itano, 1998).

This study also showed that late management of hearing loss yields similar results to those of children born with low cognition, showing that late management is an induced handicap (Figure 2).

Late intervention for hearing loss was found to be associated with decreased educational level, higher rates of school dropout, and consequently, lower income and lower health status (Porter, Neely, and Gorga, 2010).

According to 3 systematic reviews, newborn hearing screening has proven to produce better educational outcomes on the long term in addition to being cost effective. This is due to the fact that less costly accommodations would be needed for the child to meet his/her speech and language milestones on time (Alshhawi, 2019; Nelson, 2008; Yoshinaga-Itano, 2021).

Underlying Factors

Underlying factors for the lack of newborn hearing screening in Lebanon include factors related to governance, financing, service delivery and sociocultural factors.

Governance

During the key informant interviews, several stakeholders highlighted the absence of national guidelines for the practice of newborn hearing screening in Lebanon that can unify the practice across the different healthcare institutions that provide the hearing screening. There are two types of newborn hearing screenings worldwide (including Lebanon): Otoacoustic Emissions (OAE) and Automated Auditory Brainstem Response (AABR). Different countries across the world have different guidelines for when each type of screening would be used such as the United States, Russia, and Asian countries (Interacoustic, 2017). The Joint Commission on Infant Hearing (JCIH, 2019) recommends screening all newborns with OAEs except for neonatal intensive care unit babies, who should be screened with AABRs as well. JCIH also recommends screening infants in with the well-baby nursery with AABRs if the OAE screening gave a “refer” result. If both screenings show a refer result, the baby should have a diagnostic hearing test, rather than screening only, by the age of 3 months. If the hearing test revealed a hearing loss, management of this loss should be done before the age of 6 months, and thus the naming of the “1-3-6” rule was established (JCIH, 2019). Although all babies can be screened with OAEs, which are less costly than AABRs, OAEs have higher false positive rates than AABRs. Thus, having all babies screened with OAEs would require more diagnostic testing which is more expensive than AABRs.

Financing

Due to the lack of newborn hearing screening in Lebanon, interventions to address hearing loss usually happen at a late stage at which the child would have already missed acquiring key speech and language milestones. Consequently, additional accommodations would be required to address the issue which in turn increases the economic burden. These economic consequences are further exacerbated by the dire economic situation in the country which underscores the importance of early identification of hearing loss and early intervention.

The Lebanese MOPH (2018) spends annually \$520,000 on hearing and speech services and \$82,000 on fitting hearing devices. Not all insurance companies in Lebanon cover the cost of hearing screening which makes parents deprioritize this screening over other healthcare services (vaccination, blood tests, etc.,) as most need to pay it out-of-pocket.

Additionally, there is no regulation of prices across the different institutions that provide hearing screening services in Lebanon; sometimes, the price of a diagnostic test in one institution equals to the price of an OAE screening in another. This makes screening less affordable for a considerable group of the population.

Delivery Level

The Lebanese Pediatric Society has collaborated with the MOPH to provide 4 hospitals in different areas in Lebanon with OAE screening machines (Abou Samra, Soueidan, Hilal., and El-Jardali, 2018). During the key informant interviews, several stakeholders highlighted that, not all hospitals or other childcare centers have screening machines. Those who have screening machines are mostly in urban areas. Additionally, those who have a screening machine do not necessarily have the AABR feature in it. Moreover, there are less than 30 audiologists in Lebanon which makes the issue of screening all babies locally even harder due to the lack of trained healthcare professionals who can safely perform the screening and follow up with the baby if needed. It is not clear if the number of audiologists in Lebanon will increase any time soon due to the closure of the only audiology program in Lebanon in 2022.

Sociocultural

Since there are no studies that address the sociocultural determinants for the lack of newborn hearing screening in Lebanon, it might be beneficial to rely on information from countries that share similar characteristics with Lebanon to predict the sociocultural factors that might possibly exist in Lebanon.

Lack of awareness: According to a systematic review by Ravi et al. (2016), more than 50% of mothers in US and Malaysia lacked

awareness regarding the importance of early hearing loss detection and intervention and the overall idea of screening.

Negative attitude towards the screening technique: Some parents might have anxiety when the screening is repeated if needed or would think that inserting a probe into a newborn's ears might be very uncomfortable for their baby (Hergils and Hergils, 2000).

Stigma of Having a Deaf Child: Only 54% of Indian mothers showed acceptance of having hearing aids for their newborns due to social stigma [Garg et al., 2011).

Options of a policy approach to address the problem

Based on evidence and taking the Lebanese context into consideration, the following options were developed. These options are not mutually exclusive. Thus, one or more could be implemented together.

Option 1> Mandate newborn hearing screening in Lebanon and develop national guidelines on early hearing loss identification to unify practices across different institutions.

Option 2> Increase awareness of parents and the different stakeholders involved.

Option 3> Utilize data collected to develop prevalence studies in order to understand and quantify the magnitude of the problem in Lebanon.

Option 4> Recruit more of the currently available audiologists in healthcare institutions so that they can train other healthcare providers and increase their awareness while providing regular monitoring for the screening process.

Policy Options and Implementation Considerations

Option 1 Mandate newborn hearing screening in Lebanon and develop national guidelines on early hearing loss identification and unify practices across different institutions.

The United States, Britain, Asia, Europe, Africa, and some countries in Middle East have representative audiology associations that unify practices within each country based on evidence-based practice, and thus enhancing outcomes, such as increasing newborn hearing screening rates (ASHA, ISA, BSA, 2022). The JCIH (2019) recommends screening all babies with OAEs and AABRs combination as needed. Although it is more costly than having OAE screenings only, AABRs have less false positive rates which would decrease unnecessary diagnostic testing.

Screening with an AABR technology (MB 11 BERAphone[®]) would help in getting lower referral rates than those obtained from both OAEs and traditional AABRs, especially if the newborn will be staying less than 48 at the hospital after birth (Van Dyk, Swanepoel, and Hall, 2015). Additionally, screening all babies with AABRs will help in detecting Auditory Neuropathy Spectrum Disorder (ANSD), a rare disease that OAEs cannot detect due to the site of lesion being in higher areas of the auditory pathway (Van Dyk, Swanepoel, and Hall, 2015). Most importantly, what increases the cost-effectiveness of MB 11 BERAphone is that it does not need any disposable parts, unlike traditional AABRs machines that need disposable electrodes (van Dyk, Swanepoel, and Hall, 2015).

According to a systematic review on the practice of newborn hearing screening programs in Brazilian maternity hospitals, most of these programs request a diagnostic hearing test after 30 days when newborns do not pass the hearing screening at birth (Cavalcanti, Pimentel, de Melo, Buarquea, and Guerra, 2014). Based on the findings of this systematic review by Cavalcanti et al., 2014, most newborn hearing screening programs did also retest hearing

S U M M A R Y

Option 1

Amend the law to mandate newborn hearing screening in Lebanon and develop national guidelines on early hearing loss identification and unify practices across different institutions.

Option 2

Increase Awareness of Parents and the different Stakeholders Involved.

Option 3

Invest in prevalence studies to understand and quantify the magnitude of the problem in Lebanon.

Option 4

Recruit more of the currently available audiologists in healthcare institutions so that they can train other healthcare providers and increase their awareness while providing regular monitoring for the screening process.

when babies have risk factors of developing a hearing loss even if they pass the initial screening. Babies with no risk factors for hearing loss who pass the initial screening are not retested at a later follow-up stage.

Although hospital-based screening was proved to be more effective than community-based one (Oulsanya, 2009), increasing reach and accessibility is vital especially during the early stages of implementing the law. Community-based screening can run in parallel with hospital screening until all hospitals can screen in order to make it universal. Cost and affordability should be part of the national policy.

By offering the screening for reduced fees, subsidizing agencies will have to spend less on long-term costly accommodations. These subsidies could be included within general birth delivery subsidies. According to a Lebanese policy brief on disability, reimbursing primary healthcare centers could take place through a capitation payment system that was deemed as an applicable, cost-efficient option (Abou Samra, Soueidan, Hilal, and El-Jardali, 2018).

Table 1 Key findings from systematic reviews and single studies

Category of finding	Option 1
Benefits	<p>1 systematic review on the practice of newborn hearing screening in Brazilian maternity hospitals found that the optimal practice is to perform the hearing screening before leaving the maternity ward or the hospital (Cavalcanti, Pimentel, de Melo, Buarquea, and Guerra, 2014).</p> <p>1 systematic review on the practice of newborn hearing screening programs in maternity hospitals in Brazil has found that having unified national guidelines and appropriate follow up makes newborn hearing programs successful.</p>
Potential harms	1 guideline on the optimal practice of newborn hearing screening programs and

Category of finding	Option 1
	<p>which is based on several single studies have highlighted that newborns who have no observable risk factors for hearing loss and have auditory newborn spectrum disorder are missed when only screened with OAEs, however, they are not missed when screened with AABRS (JCIH, 2019).</p>
<p>Cost and/ or cost effectiveness in relation to the status quo</p>	<p>According to 1 systematic review on the practice of newborn hearing screening programs in maternity hospitals in Brazil, early screening has been proven to be more cost-effective than late diagnostic testing (Cavalcanti et al., 2014).</p>
	<p>According to 1 systematic review on the practice of newborn hearing screening programs in maternity hospitals in Brazil, poorer outcomes of newborn hearing screening programs are associated with programs that are costly. Screening rates in public hospitals are higher than those in private hospitals due to being cheaper. Among private hospitals, those with insurance coverage for maternal services, including newborn hearing screening, had the highest screening rates (Cavalcanti et al., 2014).</p>
<p>Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the approach option were pursued)</p>	<p>According to 1 systematic review on the practice of newborn hearing screening programs in maternity hospitals in Brazil, diagnostic testing rates might be lower than the actual number of babies who were referred to it (Cavalcanti et al., 2014).</p>

Option 2 Increase Awareness of Parents and the different Stakeholders Involved.

According to a systematic review by Ravi et al (2016) on the perception of parents regarding newborn hearing screening, more than 50% of mothers in US and Malaysia lacked the awareness regarding the importance of early hearing loss detection and intervention and the overall idea of screening. Awareness could be achieved through frequent advertising of the screening on TV Channels and social media (as some stakeholders recommended during the interviews). Debunking myths associated with the screening is a major aspect in sharing awareness regarding its importance. The screening should also be highlighted in national healthcare conferences and in internal meetings within healthcare institutions.

Different stakeholders should also be aware of the overall screening process and its importance while understanding how they can contribute to it. Audiologists screen, diagnose, and manage hearing loss in children and counsel their parents (Ravi, Gunjawate, Yerraguntla, Rajashekhar, 2018). Otolaryngologists, ear-nose-throat surgeons who are specialized in ear medicine, provide medical support as well as pediatricians. Nurses facilitate the screening process while technicians perform data entry and management tasks.

One systematic review on the perception of healthcare providers towards newborn hearing screening linked congenital hearing loss to the lack of awareness of primary care physicians on newborn hearing screening process, importance of early identification of hearing loss and early intervention, and details of the follow-up procedure, including referral resources in case the newborn did not pass the first screening. The study highlighted the important role primary care physicians can play as healthcare providers who routinely monitor newborns' health (Ravi et al., 2018).

Table 2 Key findings from systematic reviews and single studies

Category of finding	Option 2
Benefits	<p>1 single study highlighted the need to raise awareness, among key stakeholders involved in the process of implementation of newborn hearing screening programs (parents, politicians, audiologists, and physicians) (WHO, 2010). Topics to be covered include: the importance of early identification and management of hearing loss through early hearing loss screening and diagnostic follow-up in addition to having a family-centered approach (WHO, 2010).</p> <p>1 systematic review found that involving the different healthcare providers involved in newborn healthcare would enhance service delivery (Ravi et al., 2018).</p> <p>1 systematic review found that continuing medical education could enhance the knowledge of the medical community which would increase the latter's involvement in the process of implementing newborn hearing screening programs (Ravi et al., 2018).</p> <p>1 systematic review found that updated knowledge on hearing screening would enhance the quality of newborn hearing screening services provided (Ravi et al., 2018).</p> <p>3 systematic reviews have found that increasing awareness of parents is essential for enhancing their role as key stakeholders involved in the success of newborn hearing screening programs (Cavalcanti et al., 2014; Ravi, Gunjawate, Yerraguntla, Rajashekhar, and Lewis, 2016; Ravi et al., 2018).</p>

Category of finding	Option 2
	1 systematic review found that using different media platforms such as the internet and television channels could help spread awareness on the importance of newborn hearing screening to a wide range of audience (Ravi et al., 2018).
Potential harms	1 systematic study found that newborn hearing screening programs could cause anxiety to parents (Ravi et al., 2018).
Cost and/ or cost effectiveness in relation to the status quo	No cost studies were identified, however, few stakeholders pointed out the importance of allocating a budget for the hearing screening awareness campaigns and advertisements.
Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the approach option were pursued)	No uncertainty was reported.

Option 3 Utilize data collected to develop prevalence studies in order to understand and quantify the magnitude of the problem in Lebanon.

Prevalence studies are essential to better estimate the economic burden of hearing loss and to enhance resource allocation of hearing loss management. Uncertainty in prevalence values might be observed due to heterogeneity in the process of data collection of newborn hearing screening results and their analysis (Cavalcanti et al., 2014). This highlights the importance of having national

guidelines to unify practice across the different institutions that have newborn hearing screening programs.

1 systematic review found that prevalence studies may not reflect the actual number of newborns with hearing loss as some mothers do not follow-up with diagnostic testing after hearing screening is performed for their newborns (Cavalcanti et al., 2014).

Table 3 Key findings from systematic reviews & primary studies

Category of finding	Option 3
Benefits	1 systematic review highlighted the importance of prevalence studies to better estimate the needs of the population (Cavalcanti et al., 2014).
Potential harms	No harms were found.
Cost and/ or cost effectiveness in relation to the status quo	No cost studies were identified through literature review.
Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the approach option were pursued)	1 systematic review found that uncertainty in prevalence values might be observed due to heterogeneity in the process of data collection of newborn hearing screening results and their analysis (Cavalcanti et al., 2014). (This highlights the importance of having national guidelines to unify practice across the different institutions that have newborn hearing screening programs.) 1 systematic review found that prevalence studies may not reflect the actual number of newborns with hearing loss as some mothers do not follow-up with diagnostic testing after hearing screening is performed for their newborns (Cavalcanti et al., 2014).

Option 4 Recruit more audiologists in healthcare institutions so that they can train other healthcare providers and increase their awareness while providing regular monitoring for the screening process.

One systematic review found that the lack of audiologists recruited has decreased the rates of newborns screened (Cavalcanti et al., 2014). Several studies highlighted the importance of educating nurses and other healthcare professionals on pediatric hearing health as this would increase promotion of newborn hearing screening and help in providing better patient educational support for the parents (Araújo et al., 2013 ;O’Donovan et al, 2019).

Table 4 Key findings from systematic reviews & primary studies

Category of finding	Option 4
Benefits	1 systematic review found that having more audiologists at a hospital would decrease the chances of newborns being discharged before having the hearing screening performed for them (Cavalcanti et al., 2014).
Potential harms	No harms were found.
Cost and/ or cost effectiveness in relation to the status quo	Recruiting audiologists to manage the screening would enhance the quality of screening and decrease referral rates (Calvanti et al., 2014).
Uncertainty regarding benefits and potential harms (so monitoring and evaluation could be warranted if the approach option were pursued)	No uncertainty was reported.

Implementation considerations and counterstrategies

While implementing the above options, some of the below barriers might be observed at the patient, professional, organization, and system levels. The following are counterstrategies based on evidence from other countries on how to address them.

Table 5 Implementation Barriers and Counter-Strategies

Level	Barriers	Counter Strategies	Option(s)
Patient	Newborns leaving the hospital before having their hearing screened (Skrinska, Khneisser., Schielen, and Loeber, 2020).	Increase surveillance of newborn screening during postpartum neonatal visits (Skrinska et al., 2020).	(1)
Organization	Loss of follow up on newborns who got a "refer" result (Mumtaz et al., 2019; Naidoo and Khan, 2022; Cavalcanti et al., 2014).	Develop and utilize a management information system that tracks screening and follow up results (Mumtaz, et al., 2019; Naidoo and Khan, 2022). Enhance coordination across healthcare providers (including involving medical staff, nurses, social workers, and speech therapists), government, and the society	(1), (2)

Level	Barriers	Counter Strategies	Option(s)
		(Cavalcanti et al., 2014). Integrate newborn hearing screening with other neonatal screening programs or growth monitoring programs (Cavalcanti et al., 2014).	
System	Insufficient funding to subsidize hearing screening (United Nations, 2007). Lack of motivation by some relevant key stakeholders to act on the issue, especially because hearing loss could often be a hidden disability (Mumtaz et al., 2019).	Add hearing screening to covered child healthcare service packages such as those of routine vaccinations (Cavalcanti et al., 2014; United Nations, 2007). Showing the effectiveness of early detection of hearing loss and early intervention by highlighting its effectiveness from existing known cases using media (Mumtaz et al., 2019).	(1), (2), (3), (4) (1), (2), (3), (4)

Next Steps

The aim of this Policy Brief is to foster dialogue informed by the best available evidence. The intention is not to advocate specific policy options or close off discussion. Further actions will flow from the deliberations that the policy brief is intended to inform. These may include:

- Deliberation amongst policymakers and stakeholders regarding the policy options described in this policy brief.
- Refining options, for example by incorporating, removing or modifying some components based on the results from the national policy dialogue.

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Contact us

Faculty of Health Sciences
American University of
Beirut, Riad El Solh, Beirut
2020 1107 Beirut, Lebanon

 +961-1-350 000 ext. 2942

 www.aub.edu.lb/K2P

 K2P@aub.edu.lb

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