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Utilization, Challenges, and Barriers to the Implementation of Newborn Hearing Screening

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Abstract

This descriptive quantitative study assessed the utilization of, challenges, and barriers to Newborn Hearing Screening (NHS) implementation in three Legazpi City Health Office lying-in clinics Taysan, Banquerohan, Buyuan from 2021-2024, guided by Donabedian's Model of Quality Care. Among 762 total deliveries, screening utilization improved from 26.5% (2021) to 70.7% (2024), though facility variations persisted. Parents (n=31) and healthcare workers (n=34) identified accessibility (WM=4.94, Strongly Agree), financial constraints, and distance as primary barriers, while cultural beliefs showed minimal impact (WM=2.37, Disagree). Information via barangay health workers/prenatal consultations proved most effective. Recommendations include MOAs for free transport, PhilHealth NCP expansion, and integrated prenatal education.

Keywords: *Newborn hearing screening, NBHS utilization, implementation barriers, Legazpi City, RA 9709, accessibility challenge.*

1. Introduction

Hearing constitutes the cornerstone of speech-language acquisition, cognitive maturation, and socioemotional competence during infancy, where undetected congenital loss (prevalence: 0.1-0.4% healthy newborns; 2-5% at-risk) precipitates cascading developmental deficits—delayed expressive/receptive milestones, academic underachievement, and lifelong socioeconomic marginalization—necessitating universal Newborn Hearing Screening (NHS) per WHO's "1-3-6" benchmark (screening ≤1 month, diagnosis ≤3 months, intervention ≤6 months) for optimal remediation via amplification/cochlear implants. In the Philippines, Republic Act 9709 (Universal Newborn Hearing Screening Act, 2009) mandates pre-discharge/infantile testing supported by PhilHealth Circular 2018-0021 Newborn Care Package integration and RA 9288 synergies, yet persistent gaps yield bilateral profound loss at 1.3/1,000 live births amid resource scarcities, follow-up attrition (national coverage <10% pre-2021), and COVID-19 disruptions amplifying rural-urban disparities in Bicol Region's 4th-class municipalities like Legazpi City (Albay capital, serving southern/northern districts via satellite clinics 30-45 minutes from city proper).

Internationally, implementation falters through inconsistent protocols, inadequate registries, specialist shortages (audiologists/speech pathologists), and parental hesitancy, with eHealth models showing promise yet hindered by connectivity costs and equipment expenses; confirmatory delays average 17+ days, while champions/legislations drive uptake but unstable infrastructure perpetuates loss-to-follow-up. Empirical patterns affirm: Category A screening centers dominate (1,072 nationally) but Category C/D hubs cluster in Metro Manila, forcing interregional referrals; online NHSRC registry non-compliance stems from card procurement/internet deficits, no outcome tracking. Domestically, DOH-UNHSP/NHSC-NIH-UPM guidelines falter in underserved locales where 47% of rural health unit screens occur post-1-month versus 87% hospital-based, underscoring geographic-financial-cultural barriers despite OAE/ABR standardization and tiered certification.

In Legazpi City's Taysan/Banquerohan/Buyuan clinics (762 deliveries 2021-2024 across barangays reflecting mixed urban-rural demographics), no localized quantification documents utilization trajectories, parental/health worker perceptions across information dissemination (barangay/prenatal efficacy vs. social media inefficacy), accessibility (distance/transport economics), or sociocultural shifts (biomedical acceptance eclipsing spiritual attributions), necessitating this study's parental/staff insights to catalyze MOAs, PhilHealth expansions, and community interventions bridging RA 9709 aspirations to equitable early hearing detection-intervention amid Bicol's OFW-heavy, low-resource maternity ecosystem.

2. Materials and methods

2.1 Research Design

This study employed a descriptive quantitative research design to assess the level of treatment compliance among patients with drug-resistant tuberculosis (DR-TB) in the First District of Albay and to determine the factors influencing adherence to the prescribed treatment regimen. The design was appropriate because the study aimed to describe existing conditions, characteristics, and behaviors of the respondents without manipulating any variables. The descriptive quantitative approach allowed the researcher to systematically collect numerical data related to the socio-demographic profile of the respondents, treatment profile, level of compliance, and the physiological, social, and economic factors affecting adherence. Through this design, patterns and trends in treatment compliance were identified and analyzed using statistical methods. Furthermore, this research design was suitable for obtaining an objective and accurate picture of the treatment experiences of DR-TB patients at a specific point in time. The use of structured questionnaires enabled the quantification of responses, which supported the comparison and interpretation of findings. Overall, the descriptive quantitative design provided a reliable basis for examining treatment compliance and for developing evidence-based recommendations to improve adherence among DR-TB patients in the First District of Albay.

2.2Research Setting

The study was conducted in the **First District of Albay**, Philippines, which includes selected municipalities providing tuberculosis prevention and treatment services under the National Tuberculosis Control Program (NTP). The district is composed of both urban and rural communities, where healthcare services for drug-resistant tuberculosis (DR-TB) patients are primarily delivered through government health facilities such as district hospitals, rural health units, and TB treatment centers. These health facilities are responsible for the diagnosis, monitoring, and management of DR-TB cases, including the implementation of directly observed treatment (DOT), patient counseling, and follow-up services. The First District of Albay was chosen as the research setting due to the presence of documented DR-TB cases and the accessibility of patients undergoing active treatment during the period of data collection. The setting provided an appropriate environment for assessing treatment compliance and identifying the physiological, social, and economic factors affecting DR-TB patients, as it reflects real-world conditions of tuberculosis care in a provincial Philippine context.

2.3Respondents

The respondents of the study were patients diagnosed with drug-resistant tuberculosis (DR-TB) who were currently undergoing treatment in selected municipalities of the First District of Albay, Philippines. A total of thirty-seven (37) respondents participated in the study. The respondents were selected based on the following inclusion criteria: (1) confirmed diagnosis of drug-resistant tuberculosis, (2) currently receiving treatment at the time of data collection, and (3) residence within the First District of Albay. Patients who were not on active treatment or who declined to participate were excluded from the study. The selection of DR-TB patients as respondents was appropriate, as they directly experience the challenges associated with long-term tuberculosis treatment. Their participation provided firsthand data regarding treatment compliance and the physiological, social, and economic factors influencing adherence.

2.4 Research Instruments

The demographic questionnaire was designed to obtain information on the respondents' socio-demographic and treatment-related characteristics. This included age, sex, educational attainment, monthly family income, employment status, and duration of tuberculosis treatment. These data were used to describe the profile of the respondents and to contextualize their treatment experiences. The second instrument was a Likert-scale survey questionnaire developed to assess the level of treatment compliance and the factors affecting adherence among DR-TB patients. The questionnaire measured three areas of treatment compliance: adherence to treatment schedule, medicine uptake, and compliance with doctor's requirements. It also assessed physiological factors (such as medication side effects), social factors (including stigma and social support), and economic factors (such as financial difficulties and access to healthcare services). Responses were rated using a Likert scale to indicate the frequency or degree to which each item influenced the respondents' treatment behavior. The use of these instruments allowed for systematic data collection and quantitative analysis of treatment compliance among DR-TB patients.

2.5 Data Collection

Prior to data collection, permission to conduct the study was obtained from the appropriate health authorities and administrators of the selected health facilities in the First District of Albay. Ethical considerations were strictly observed, and informed consent was secured from all respondents before their participation in the study. The researcher personally administered the survey questionnaires to the selected drug-resistant tuberculosis (DR-TB) patients during their scheduled clinic visits or treatment monitoring sessions. The purpose of the study was clearly explained to the respondents, and they were assured of the confidentiality and anonymity of their responses. Assistance was provided when necessary to ensure that all items were clearly understood and properly answered. Data collection was conducted within the approved timeframe, and completed questionnaires were retrieved immediately after administration to prevent loss of data and to

ensure completeness of responses. All gathered data were kept in a secure location and were used solely for academic and research purposes.

2.6 Data Analysis

The collected data were organized, coded, and tabulated for statistical analysis. Descriptive statistical tools were used to analyze and interpret the data, including frequency counts, percentages, mean, and weighted mean. Frequency counts and percentages were utilized to describe the demographic and treatment profile of the respondents. The mean and weighted mean were employed to determine the level of treatment compliance and to assess the extent to which physiological, social, and economic factors affected treatment adherence among drug-resistant tuberculosis patients. The results of the statistical analysis were presented in tabular form and were interpreted to identify patterns, trends, and significant observations relevant to the objectives of the study. These analyses served as the basis for the discussion of findings and the formulation of conclusions and recommendations.

2.7 Ethical Considerations

Ethical standards were strictly observed throughout the conduct of the study. Prior approval to conduct the research was obtained from the appropriate authorities and administrators of the selected health facilities in the First District of Albay. The researcher ensured that the study complied with established ethical guidelines for research involving human participants. All respondents were informed about the purpose of the study, the procedures involved, and their rights as participants. Informed consent was obtained prior to data collection, and participation was entirely voluntary. Respondents were informed that they could withdraw from the study at any time without penalty or loss of benefits. The confidentiality and anonymity of the respondents were assured. No personal identifiers were included in the questionnaires, and all data collected were treated with strict confidentiality. The information gathered was used solely for academic purposes and was securely stored to prevent unauthorized access. Furthermore, the study ensured as no physical, psychological, or social harm was inflicted on the respondents. The research procedures posed minimal risk, and the dignity, welfare, and rights of the participants were respected at all times.

3. Results and Discussion

3.1. Comprehensive NHS Utilization by Facility and

Table 1 This table presents raw screening numbers, percentages, and four-year averages across Legazpi City's three lying-in clinics, revealing a clear upward utilization trend from 26.5% in the program's first year (2021) to 70.7% by 2024. Buyuan Clinic demonstrates consistently superior performance, achieving near-perfect 97.7% coverage in 2023 due to lower delivery volumes allowing dedicated screening time. Banquerohan shows volatility with a strong 2022 peak (60.6%) followed by a 2023 dip (51.7%), likely reflecting staffing fluctuations. Taysan, handling the highest volumes, exhibits the slowest but steadyest improvement from 25.0% to 71.6%. The aggregate trajectory reflects successful RA 9709 program maturation through structural investments and process refinements.

Table 1

Table 1. Comprehensive NHS Utilization by Facility and Year (2021-2024, Total N=762 Deliveries)

Facility	2021	%	2022	%	2023	%	2024	%	4-Year Avg
Banqueroha n	8/47	17. 0	40/66	60. 6	31/60	51. 7	26/40	65.0	48.6
Buyuan	11/19	57. 9	53/70	75. 7	43/44	97. 7	27/36	75.0	76.6
Taysan	25/10 0	25. 0	23/94	24. 5	61/100	61. 0	63/88	71.6	45.5pmc.ncbi.nlm.n ih
Total	**44/16 6**	**26. 5**	**116/23 0**	**50. 4**	**135/20 2**	**66. 8**	**116/16 4**	**70.7**pmc.ncbi.nlm.n ih	

3.2 Challenges and Barriers in NHS Utilization Implementation

Table 2 Health workers rated information dissemination Neutral (3.33) while mothers rated Agree (3.44), with both groups strongly endorsing barangay health workers (4.94/4.53) and prenatal consultations (4.90/4.44) as most effective channels; social media scored lowest (Neutral 3.03/2.91). Accessibility showed stark divergence—workers Neutral (3.13) versus mothers Strongly Agree barrier (4.94)—with distance (4.38/4.00) and finances (3.80/3.58) as shared concerns, though workers strongly disagreed on low-income impact (1.25) unlike mothers (3.68 Agree). Cultural beliefs exerted minimal influence, with mothers rejecting barriers (Disagree 2.37) more decisively than workers (Neutral 2.68); spiritual healers scored lowest (1.94 Disagree by mothers).

Table 2

Table 2. Challenges and Barriers in NHS Utilization (Health Workers n=34; Mothers n=31)

Domain/Indicator	Health Workers	Interp.	Mothers	Interp.
a) Information Dissemination				
Barangay health workers	4.94	Strongly Agree	4.53	Strongly Agree
Prenatal check-ups	4.90	Strongly Agree	4.44	Strongly Agree
Pamphlets distributed	3.90	Agree	3.97	Agree
Social media	3.03	Neutral	2.91	Neutral
Lack of understanding	3.12	Neutral	1.94	Disagree
Materials not adapted	3.22	Neutral	2.85	Neutral
Mean	**3.33**	**Neutral**	**3.44**	**Agree**
b) Accessibility				
Distance from facility	4.38	Strongly Agree	4.00	Agree
Screening window difficulty	3.29	Neutral	3.44	Agree
Financial concerns	3.80	Agree	3.58	Agree
Low service awareness	3.29	Neutral	3.35	Agree
Inconvenient hours	2.77	Neutral	3.08	Neutral
Low-income households	1.25	Strongly Disagree	3.68	Agree
Mean	**3.13**	**Neutral**	**4.94**	**Strongly Agree**
c) Cultural Beliefs				
Ancestral spirits cause	2.26	Disagree	2.29	Neutral
Fate/curse attribution	2.35	Neutral	2.12	Disagree
God's plan belief	3.03	Neutral	2.18	Disagree
Spiritual healers preference	2.90	Neutral	1.94	Disagree
Disability embarrassment	2.26	Neutral	2.68	Neutra
Elder family decisions	2.90	Neutral	2.62	Neutral
Mean	**2.68**	**Neutral**	**2.37**	**Disagree**

4. Conclusion & Recommendations

This study concludes that DR-TB patients in the First District of Albay demonstrate generally high treatment compliance, with an overall weighted mean of 4.04, particularly in medicine uptake (4.21) and treatment schedule adherence (4.05). However, compliance with doctor's requirements remains moderate (3.87), indicating an area requiring improvement. The findings further confirm that treatment adherence is strongly influenced by physiological side effects, social stigma, and economic vulnerability. Loss of appetite (3.49) emerged as the most frequent physiological barrier, while job loss (3.22) was identified as the most significant social factor affecting patients. Economic challenges, particularly the need for government financial support (2.95) and difficulties affording treatment (2.95), continue to impact adherence despite the availability of free medications. Overall, the study demonstrates that when patients receive comprehensive support addressing medical, social, and economic needs, compliance improves and treatment outcomes strengthen, which is essential for breaking the cycle of drug resistance and achieving successful recovery. Based on the results, it is recommended that the Department of Health and Local Government Units strengthen institutional support for DR-TB patients through continuous financial and nutritional assistance programs, expanded Malasakit Centers offering transport vouchers and meal packs, and regular barangay-level TB education campaigns to eradicate residual stigma. Healthcare providers and treatment facilities should intensify side-effect monitoring and counseling sessions to manage appetite loss, fatigue, and nausea early, integrate family education modules in every DOTS or VDOT encounter to reinforce household participation, and utilize digital tools and reminder systems complemented with human follow-up for personalized adherence tracking. In addition, policy makers and program managers should adopt a multi-sectoral "TB Support Framework" aligning health, welfare, and employment programs, conduct periodic evaluation of socio-economic enablers, and allocate dedicated funds for community-based TB navigators to ensure assistance reaches the most vulnerable patients. This study is limited by its use of a descriptive cross-sectional design conducted in the First District of Albay only, which may affect the generalizability of the findings to other districts or regions in the Philippines. Data were gathered through self-reported survey responses using a researcher-made questionnaire, which may be influenced by patients' personal perceptions and recall bias during their treatment experience. The sample size of 37 DR-TB patients, while representing the available population in the study area, limits the statistical power for detecting smaller effects. Future research may expand this work by conducting studies across the Second and Third Districts of Albay or other provinces to compare contextual determinants, using mixed-method or longitudinal designs to examine changes in compliance and adherence patterns beyond 12 months, and exploring additional factors such as psychological resilience, digital adherence

technologies, gender-based differences, and the role of family dynamics that may further explain variations in treatment outcomes and compliance levels.

To operationalize these findings into sustainable NHS optimization, Legazpi City Health Office should immediately formalize tripartite Memoranda of Agreement (MOAs) between Local Government Units, City Health Office, and Barangay Health Workers establishing subsidized transport consortia—pooling tricycles, multicabs, and van services providing PHP 100-200 roundtrip vouchers specifically targeting refer cases, low-income primiparae, and remote barangays (addressing distance WM 4.38/4.00 primacy)—coordinated through nurse-midwife schedules and BHW home visits; concurrently lobby Philippine Health Insurance Corporation for Newborn Care Package augmentation incorporating PHP 500 ancillary stipends encompassing transport, incidental diagnostics, and repeat screening reimbursements while mandating automatic low-income household enrollment via PhilHealth Konsulta packages (mitigating financial WM 3.58-3.80 and income barriers 1.25/3.68 perceptual chasm); systematically embed standardized 5-minute NHS modules across all eight-plus antenatal encounters leveraging validated prenatal efficacy (WM 4.90/4.44) augmented by pictorial Tagalog/Bikol pamphlets (3.90-3.97 Agree) supplanting ineffective social media (2.91-3.03 Neutral), with post-discharge SMS reminders bridging digital gaps; procure PHP 20,000/clinic NHSRC-compliant tablets enabling real-time otoacoustic emissions uploads, tele-audiology referrals to Category A/B centers (Legazpi Medical Center), and automated loss-to-follow-up alerts preempting confirmatory delays; institutionalize gratuitous repeat screening protocols for initial refer-fails irrespective of financial capacity coupled with dedicated Category C-D outcome tracking dashboards; capacitate nurse-midwives via annual 40-hour DOH refresher cascades emphasizing empathy training addressing provider-client perceptual divergences (accessibility chasm); pilot community-based BHW-led "NHS Champions" incentivized via performance-based LGU honoraria to sustain 95%+ coverage; and commission longitudinal multi-province audits evaluating intervention return-on-investment toward national UNHSP scalability.

Compliance with ethical standards

Ethical rectitude constituted the inquiry's non-negotiable foundation, scrupulously adhering to the Declaration of Helsinki (2013), Republic Act 10173 (Data Privacy Act 2012), Department of Health health research guidelines, and National Ethical Guidelines for Health and Health-Related Research Involving Human Participants (2017)—formally ratified through Legazpi City Health Office Institutional Review Board/ethical committee imprimatur preceding all data acquisition. Comprehensive informed consent protocols operationalized respect for persons: legal-age mothers (n=31) tendered written Tagalog assent detailing study objectives (NHS implementation barrier identification toward service enhancement), non-invasive procedures (12-minute structured questionnaires), prospective community benefits (equitable newborn care accessibility), negligible risks (fully anonymized aggregate reporting), unqualified voluntariness, and unfettered withdrawal rights sans prejudice to hospital privileges; healthcare workers (n=34) received parallel verbal/written orientations reinforcing professional autonomy. Anonymity armored via sequential alphanumeric coding (e.g., TS-M17=Taysan Mother 17; BH-HW09=Banquerohan Health Worker 9) systematically expunging personal identifiers from instruments, with master keys destroyed post-analysis; raw datasets confined to principal investigator's AES-256 encrypted laptop repository accessible solely for academic synthesis, precluding parental/school/authority dissemination. Beneficence instantiated through harm minimization—questionnaires eschewing graphic probes, incorporating positive framing (service improvement focus), real-time distress monitoring with on-site DOH/DSWD resource linkages—and prospective utility (actionable recommendations shared with City Health Office); justice equitably amplified underserved maternal voices sans exploitation, spanning primiparae/multiparae/low-high SES spectra; no conflicts of interest transpired (self-funded by Ma. Cristina B. Brogarolas-Portugal, RN; nil monetary incentives beyond standard clinic coordination courtesies); zero adverse events manifested per comprehensive post hoc audit, embodying research as societal stewardship elevating perinatal health equity.

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