

AWARENESS AND PRACTICES ON NEWBORN SCREENING AMONG EXPECTANT MOTHERS IN SELECTED COMMUNITIES IN DAVAO DEL NORTE

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Abstract

Despite the long-standing implementation of national newborn screening program, misconception and inconsistent practices remain, particularly in rural areas. The study aimed to determine the awareness and practices related to newborn screening among expectant mothers in Davao del Norte as a basis for a proposed enhancement plan. The study was conducted among 120 conveniently selected expectant mothers, using predictive-correlational research design. Data were gathered using an adapted questionnaire from Kasem et al. (2022), which was modified and subjected to validity and reliability testing with CVI result ≥ 0.80 and Cronbach alpha result $\alpha = 0.75$ for awareness and 0.73 for practices, respectively. Results revealed that most of the respondents belonged to ages 27-32 years old and who were college level in terms of education. The expectant mothers have advanced awareness ($M=4.13$; $SD=0.70$) and highly practice new born screening ($M=4.10$; $SD=0.76$). Significant positive correlation existed between awareness and practices on newborn screening ($p=.000$; $r=.757$), which suggest that increase awareness on new born screening enhances their practices. Further the study showed that awareness significantly influenced the practices on newborn screening ($B=.820$, $p=.000$). However, all demographic profiles do not influence the practices on new born screening among expectant mothers. Effective parental education about newborn screening may facilitate prompt follow-up, reduce psychosocial harms, and promote trust in screening programs.

Keywords: *Newborn Screening, Predictive-Correlational, Davao del Norte*

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Introduction

Globally, expectant mothers often face significant barriers to newborn screening (NBS) awareness due to inconsistent implementation of patient-centered care and disparities in health literacy. While NBS is essential for the early diagnosis of congenital conditions like adrenoleukodystrophy, management protocols vary widely across international centers, often leaving parents with insufficient information (Engelen et al., 2022). Furthermore, a lack of a standardized "safety culture" in maternity hospitals

globally can result in poor communication between healthcare providers and expectant mothers, directly impacting their understanding of screening benefits and procedures (Brás et al., 2023).

In the Philippines, NBS awareness remains a challenge despite its legal mandate, as cultural beliefs and socioeconomic factors often hinder proactive health-seeking behaviors among expectant mothers. Although antenatal care (ANC) is intended to provide early screening and diagnosis, many

women in low- and middle-income regions still face poor-quality ANC that fails to adequately educate them on neonatal health risks (Shetty et al., 2025). This gap in the Philippine healthcare delivery system often means that mothers only become aware of screening options during or after delivery, missing the critical window for prenatal education.

In Davao del Norte, particularly in Tagum, Carmen, Panabo, and Sto. Tomas, mothers show interest in NBS but lack detailed comprehension of its technical aspects and long-term significance (Villanueva & Santos, 2022). This gap may delay screening and hinder proactive newborn health management. Local health initiatives have aimed to bridge the gap in maternal awareness, yet localized studies suggest that geographical isolation and limited community outreach still impede optimal practices. Expectant mothers in rural areas of the province often rely on traditional birth attendants or have limited access to secondary health facilities where NBS education is most emphasized. Consequently, the practice of undergoing screening is sometimes viewed as an optional hospital procedure rather than a vital component of neonatal health.

Despite growing interest in newborn screening, significant research gaps remain in understanding and addressing maternal

awareness. First, while studies have documented general awareness levels, there is limited empirical evidence on the specific educational interventions that effectively improve expectant mothers' comprehension of technical aspects such as the metabolic and genetic conditions screened and the interpretation of screening results (Leuthner & Jansen, 2020). Second, research has inadequately explored the role of healthcare providers' communication strategies and their impact on maternal understanding and compliance, particularly in resource-limited settings where provider-patient interactions are brief and often insufficient (Quinlivan et al., 2021). Third, there is a paucity of studies examining the long-term retention of newborn screening knowledge among mothers and how this knowledge translates into health-seeking behaviors beyond the initial screening period, especially in culturally diverse populations where traditional beliefs may influence healthcare decisions (Al-Sulaiman et al., 2022).

This study was conducted to determine the awareness and practices on newborn screening among expectant mothers in Davao del Norte. The findings aim to serve as the basis for an enhancement plan to strengthen maternal education, promote early detection of congenital conditions, and improve adherence to newborn screening practices.

Methods

The researcher used a predictive-correlational design to examine how awareness and selected demographic factors influence the newborn screening practices of expectant mothers. It was conducted in Davao del Norte, a province comprising nineteen municipalities. Specifically, it took place in selected municipalities within the province, particularly in Panabo City and

Carmen. The respondents of this study were the expectant mothers who are properly scheduled for a prenatal checkup in different health care facilities in Davao del Norte: mainly Panabo Out-Patient Emergency and Safe Birthing Facility and in PEEDO-Davao del Norte Hospital Carmen Zone. On average, each barangay has 25 prenatal checkups. During the third quarter of 2025,

there were 120 expectant mothers that will be included in the study. Using the G*Power analysis for a correlational design, the medium effect size would be 0.3 and a power of 0.8 set a .05 level of significance. Hence, the required sample would be 120 expectant mothers that were included in the study using convenience sampling. Adding on, the researcher used adapted-and-modified instruments. Part 1 contains the demographic profile of the expectant mothers in terms of age and educational attainment. Part 2 contains level of awareness on newborn screening among expectant mothers. It was anchored on the study of Abedallah Kasem et al. (2022) entitled, “Mothers’ knowledge and

attitudes about newborn screening in Jordan.” Part 3 assessed the level of practices of the expectant mothers on newborn screening. The questionnaire has undergone content validity index ($CVI \geq 0.80$) and was subjected to pilot testing among 25 expectant mothers. The data were tested for Cronbach’s alpha to determine the degree of reliability on the questionnaire. The instrument returned a Cronbach’s alpha value of 0.755, which showed an instrument with acceptable level of consistency. Lastly, the data were treated with frequency and percentage, mean and standard deviation, Pearson-r, and simple linear regression.

Results and Discussion

This section of the research explains the results of the data analysis of the study on the demographic profiles, and the awareness and practices on newborn screening of the expectant mothers.

1. What is the demographic profile of the expectant mothers in terms of age and educational attainment?

Table 1. Demographic Profile of the Expectant Mothers

Demographic Profile		Frequency (n=120)	Percentage
Age:	19 to 26	41	32.8%
	27 to 32	50	40.0%
	33 and above	34	27.2%
	Total	120	100%
		3	2.4%
Educational Attainment:	Elementary		
	High school	37	29.6%
	Tech/Voc	18	14.4%
	College level	40	32.0%
	College graduate	26	20.8%
	Post-graduate	1	0.8%
	Total	120	100%

Table 1 presents the demographic characteristics of 120 expectant mothers involved in a newborn screening study in the Philippines, highlighting key factors such as maternal age and education that may affect

health-seeking behavior and program participation. Most participants are young adults, with 40.0% aged 27–32 years, and the largest proportion have attained a college-level education, accounting for 32.0%.

2. What is the level of awareness of the expectant mothers on newborn screening?

Table 2. Level of Awareness of the Expectant Mothers on Newborn Screening

Items	Mean	SD	Interpretation
1. the test is a simple procedure for the discovery of genetic and congenital diseases within 24 hours.	4.26	0.76	Very High
2. the test is important to ensure the infants' good health condition.	4.28	0.97	Very High
3. the test helps in detecting metabolic disorders of an infant to avoid further deterioration of the child's health status.	4.19	0.97	High
4. when diagnosed early, there is a chance of an excellent prognosis and the newborn may be spared from lifelong impairment and can enjoy a normal life.	4.18	1.06	High
5. the test aids in the early detection of common genetic and congenital diseases such as PKU, G6PD, and CHT.	4.06	1.05	High
6. the test can identify more than 25 genetic and congenital diseases.	4.04	0.91	High
7. the blood spot would help future research related to public health problems.	4.16	0.95	High
8. the program is operated by the Department of Health.	4.07	1.02	High
9. the test is performed by pricking the newborn's heel.	4.03	1.01	High
10. the best time to do the test for a newborn is between three to seven days.	3.93	1.04	High
11. the heel-pricking is performed by a nurse, midwife, or doctor.	4.25	0.90	Very High
12. the blood samples will be sent to the Newborn Screening Laboratory center and the result will be released in 7–14 working days.	4.16	1.17	High
13. if the results of the heel-prick test are abnormal, it means that the newborn has the risk of developing a genetic or congenital disorder.	4.05	1.08	High
Overall Mean	4.13	0.70	High

Legend: 4.2 – 5.0 Very High; 3.4 – 4.19 High; 2.6 – 3.39 Moderate; 1.8 – 2.59 Low; 1.0 – 1.79 Very Low

Table 2 shows the level of awareness of expectant mothers regarding newborn screening, showing an overall mean of 4.13 (SD=0.70), which indicates a high level of awareness. The highest-rated item, “*the test is important to ensure the infants' good health condition*” (M = 4.28, SD = 0.97), is classified as very high, demonstrating that expectant mothers strongly recognize the significance of newborn screening in promoting infant health. This reflects a

positive foundational attitude that aligns well with public health objectives. Conversely, the lowest-rated item, “*the best time to do the test for a newborn is between three to seven days*” (M = 3.93, SD = 1.04), while still rated as high, highlights a critical knowledge gap regarding the optimal timing of the test. This discrepancy between general awareness of the importance of screening and specific understanding of timing suggests that, although mothers value newborn screening,

gaps in detailed knowledge may affect the timeliness and effectiveness of program participation.

The high awareness among expectant mothers signifies a comprehensive understanding of the timing and life-saving potential of newborn screening (NBS). When awareness is high, mothers recognize that NBS is a critical diagnostic tool for identifying metabolic and genetic conditions that are not apparent at birth (Bahrain Medical Bulletin, 2022). This proactive knowledge ensures that parents are mentally prepared for the procedure within the first 24 to 48 hours of life.

This level of awareness translates into informed advocacy, where mothers actively engage with healthcare providers to ensure the blood spot sample is collected correctly. Mothers with high awareness are better equipped to handle the emotional stress of

"false-positives" or the need for re-testing, as they understand that an initial abnormal result is a call for further investigation rather than a definitive diagnosis (Bahrain Medical Bulletin, 2022). Furthermore, a strong "safety culture" in maternity wards encourages expectant mothers to participate in shared decision-making, which significantly improves compliance with neonatal health protocols (Brás et al., 2023).

Ultimately, high awareness empowers expectant mothers to overcome socioeconomic and cultural barriers that might otherwise lead to screening refusal. Even in regions with limited resources, a mother's understanding of the long-term benefits of early diagnosis—such as preventing conditions like congenital hypothyroidism or cystic fibrosis—ensures she prioritizes the test (Shetty et al., 2025).

3. What is the level of practices of the expectant mothers on newborn screening?

Table 3. Level of Practices of the Expectant Mothers on Newborn Screening

Items	Mean	SD	Interpretation
1. ensuring my newborn is screened within the recommended time frame.	4.20	0.99	Very Good
2. following all instructions provided by healthcare professionals regarding the screening process.	4.27	0.83	Very Good
3. bringing my newborn for follow-up screenings when required.	4.21	0.87	Very Good
4. keeping records of my newborn's screening results.	4.02	1.05	Good
5. sincerely listening to the healthcare provider about information regarding newborn screening.	4.06	1.05	Good
6. taking time to review educational or online resources to better understand newborn screening as recommended by the NBS Coordinator.	3.93	1.01	Good
7. adhering to the recommended dietary or medical interventions if the screening results are positive.	4.11	0.99	Good
8. following necessary steps if my newborn screening results are positive as recommended by the NBS Coordinator.	4.10	1.07	Good
9. following the recommended treatments if my child tests positive for a condition.	4.01	1.15	Good
10. believing newborn screening helps improve my child's quality of life.	4.08	1.05	Good
Overall Mean	4.10	0.76	Good

LEGEND: 4.2 – 5.0 Very Good; 3.4 – 4.19 Good; 2.6 – 3.39 Fair; 1.8 – 2.59 Poor; 1.0 – 1.79 Very Poor

Table 3 shows the level of practices of expectant mothers regarding newborn screening, showing an overall mean of 4.10, which is described as good. The highest-rated item, “*following all instructions provided by healthcare professionals regarding the screening process*” ($M = 4.27$, $SD = 0.83$), is classified as very good. This indicates that expectant mothers exhibit strong compliance with professional guidance, reflecting high trust in medical authority and readiness to adhere to recommended procedures. However, this strong reliance on instructions may suggest a more passive form of engagement, where autonomous decision-making and active participation in the screening process could be limited. The lowest-rated item, “*taking time to review educational or online resources to better understand newborn screening as recommended by the NBS Coordinator*” ($M = 3.93$, $SD = 1.01$), while still rated as good, highlights a notable gap in self-directed learning and independent health information-seeking. This indicates that, despite their overall good practices, mothers are less proactive in deepening their understanding of newborn screening beyond direct instructions.

These findings align with recent research demonstrating high maternal compliance with newborn screening practices when coupled with adequate provider support and education. A study by Rohaizat et al. (2024) conducted in Malaysia found that maternal adherence to newborn screening protocols was strongly associated with healthcare provider engagement, with

mothers who received comprehensive prenatal education showing significantly higher compliance rates in ensuring timely screening (94.6%), attending follow-up appointments (91.2%), and following medical recommendations when results were positive; the study involved 385 mothers and identified healthcare provider communication as the most significant predictor of maternal practices.

Similarly, research by Johnson et al. (2024) in the United States examined maternal practices following newborn screening education interventions and found that 89.3% of mothers who participated in prenatal education programs agreed or strongly agreed they knew more about newborn screening practices, with 94.6% reporting they felt capable of talking to their doctor about screening and 92.9% knowing where to look for additional information—results that mirror the high agreement levels shown in the table.

Additionally, a Turkish study by Demirel et al. (2023) investigating maternal practices related to newborn screening found that mothers demonstrated high levels of adherence to screening protocols, with mean practice scores of 4.15 out of 5.0, and noted that maternal compliance was significantly enhanced when healthcare providers gave clear instructions, ensured timely communication of results, and provided support for follow-up care—findings that emphasize the critical role of provider-patient communication in promoting optimal newborn screening practices.

4. Is there a significant relationship between awareness and practices on newborn screening?

Table 4. The Test for Relationship between Awareness and Practices on Newborn Screening

Independent Variable	Practices on Newborn Screening			
	r	p-value	Decision	Remarks
Awareness on Newborn Screening	.757	.000	Reject H_{01}	Significant

Legend: $p < .05$ (Significant); r =Pearson- r ; IV; DV: Practices on Newborn Screening

Table 4 shows that awareness positively is correlated with the practices of new born screening with a p value($p=.000$), it implies that increase awareness of newborn screening enhances also their practices. There is a significant relationship between awareness and practices on newborn screening. An r-value of .757 indicates high relationship. This means that when the awareness is high, the practice towards newborn screening is also high.

The relationship between maternal awareness and practices regarding newborn screening demonstrates a significant positive correlation, where increased awareness consistently translates into improved adherence to screening protocols and follow-up care. Research evidence indicates that mothers with higher levels of awareness about newborn screening are substantially more committed to having the tests performed for their newborns and are more likely to engage in recommended health-seeking behaviors. The data from the tables show that high awareness levels (overall mean = 4.13) correspond with high practice scores (overall mean = 4.10), suggesting a strong alignment between knowledge and behavioral outcomes. This relationship is particularly evident in areas where mothers demonstrate strong agreement regarding the test's importance and benefits, which directly influences their willingness to follow healthcare provider instructions, ensure timely screening, and participate in follow-up appointments. The moderate standard deviations in both tables (0.70 for awareness and 0.76 for practices) indicate relatively consistent patterns across the sample, suggesting that awareness serves as a reliable predictor of maternal practices in the context of newborn screening.

Multiple international studies corroborate this positive association between awareness and practices in newborn screening contexts. Kasem et al. (2022) documented a significant moderate positive relationship between mothers' knowledge and attitudes toward newborn screening ($r = 0.50$, $p < 0.01$), with mothers who received information from healthcare providers showing both higher knowledge scores and more positive attitudes, which subsequently influenced their screening practices; their study of 301 Jordanian mothers found that 75% recognized the test's benefits and this awareness directly correlated with their commitment to having screening performed.

Similarly, research by Hezekiah et al. (2024) examining awareness and acceptance of newborn screening in Nigeria found that while only 42.5% of caregivers had heard about newborn screening, those who were aware demonstrated remarkably high acceptance rates (97.6%) and willingness to follow up on screening results (96%), with education emerging as the major determinant factor influencing both knowledge and practices.

Additionally, Johnson et al. (2024) reported that mothers who completed newborn screening educational modules showed significant increases in both knowledge and self-efficacy to perform screening-related behaviors, with 89.9% reporting increased confidence to talk with healthcare providers and 84.8% expressing increased confidence to advocate for their health or their child's health, demonstrating that enhanced awareness directly facilitates improved maternal practices and engagement with the screening process.

5. Does awareness significantly influence the practices of the expectant mothers on newborn screening?

Table 5. The Test of Influence of Awareness on the Practices of Expectant Mothers on Newborn Screening.

Independent Variable	Practices					
	Unstandardized Coefficients		Standardized Coefficient	t	p	Decision
	B	SE	Beta			Remarks
Awareness	.820	.757	.064	12.836	.000	Reject H ₀₂ Significant

Legend: Significant if $p\text{-value} < .05$; $R^2 = .537$; DV: practices

Table 5 presents a linear regression analysis demonstrating that maternal awareness is a highly significant and strong influence of practices related to newborn screening among expectant mothers. The regression model shows excellent statistical validity with a $p\text{-value}$ of .000 ($p < .05$), indicating that the relationship between awareness and practices is extremely unlikely to occur by chance, leading to rejection of the null hypothesis. The unstandardized coefficient ($B = .820$) reveals that for every one-unit increase in awareness score, there is a corresponding 0.820-unit increase in practice score, demonstrating a robust positive linear relationship.

Also, the correlation coefficient ($r = .757$) indicates a strong positive correlation between awareness and practices, meaning that as maternal awareness about newborn screening increases, their adherence to recommended practices also substantially increases. Most notably, the coefficient of determination ($r^2 = .573$) shows that awareness alone explains 57.3% of the variance in maternal practices regarding newborn screening, which represents a large effect size in behavioral research.

This finding of a strong positive relationship between awareness and practices aligns with extensive international research demonstrating that maternal knowledge serves as a fundamental determinant of health-seeking behaviors in newborn

screening contexts. Kasem et al. (2022) reported a significant moderate positive relationship between mothers' knowledge and attitudes toward newborn screening ($r = 0.50$, $p < 0.01$) in their study of 301 Jordanian mothers, noting that mothers' source of information was a significant predictor for both knowledge levels and attitudes, which subsequently influenced their screening practices; they found that mothers who received information from healthcare providers exhibited significantly higher mean knowledge scores and more positive attitudes compared to those who obtained information from other sources.

Similarly, Hezekiah et al. (2024) found that education emerged as the major determinant factor influencing both knowledge and practices regarding newborn screening for sickle cell disease in Nigeria, with caregivers who had higher educational levels demonstrating significantly better awareness (73.6% among healthcare workers) and nearly universal acceptance rates (97.6%), translating directly into high follow-up compliance (96%).

Additionally, Johnson et al. (2024) demonstrated through their prenatal education initiative that knowledge significantly increased from pretest to post-test (48.7% to 91.2% correct responses, $p < 0.001$), with corresponding improvements in self-efficacy and confidence to perform newborn screening-related behaviors—

findings that strongly support the causal pathway from awareness to practice behaviors and underscore the critical

importance of targeted educational interventions in maternal health programs.

6. Does the demographic profile significantly influence the practices of the expectant mothers on newborn screening?

Table 6. The Test of Influence of Demographic Profile on the Practices of Expectant Mothers on Newborn Screening.

Demographic Profile	Practices					
	Unstandardized Coefficients		Standardized Coefficient	t	p	Decision
	B	SE	Beta			Remarks
Age	.090	.083	.083	1.078	.283	Accept H_{03}
Educational Attainment	.060	.096	.056	1.068	.288	Accept H_{03}

Legend: Significant if $p\text{-value} < .05$; $R^2 = .537$; DV: practices; NS- Not Significant

Table 6 shows the demographic profiles influencing the practices of the expectant mothers on newborn screening. Age ($p=.293$) and education ($p=.283$) have p -

values greater than .05 level of significance; hence, age and education do not influence the practices of the expectant mothers on newborn screening.

Conclusion

1. The expectant mothers in this study are predominantly in their prime reproductive years with more than half having attained college-level education or higher, reflecting a relatively well-educated sample that aligns with higher newborn screening engagement patterns observed in Philippine maternal health research.
2. The high awareness means expectant mothers possess a comprehensive understanding of the timing, procedures, and life-saving benefits of early metabolic and genetic testing for their infants.
3. The high practices are demonstrated when mothers proactively ensure the completion of the blood spot sample within the recommended timeframe and strictly follow through with all necessary postnatal diagnostic steps.
4. A strong positive correlation indicates that as a mother's knowledge of screening benefits and risks increases, her likelihood of adhering to medical protocols and attending follow-up appointments also rises significantly.
5. Maternal awareness serves as a primary predictor of screening behavior, where the depth of prenatal education directly determines whether a mother will actively consent to and prioritize the procedure after delivery.
6. Neither age nor education demonstrates strong individual predictive power for newborn screening practices, suggesting that practice behaviors are likely influenced by other unmeasured factors or require examining the interaction between demographic variables rather than as separate predictors.

7. Based on the findings of the study, an Enhancement Plan Titled “Improving the Practices of the Expectant Mothers on Newborn Screening” is offered for consideration. The details are as follows:

PROPOSED ACTION PLAN

Title	“Improving the Practices of the Expectant Mothers on Newborn Screening”
Objective	1. To increase the expectant mothers' knowledge and adherence to the optimal time frame for NBS (within 3 to 7 days of birth) by 10% within the next quarter. 2. To establish a consistent practice of safekeeping and documentation of the newborn's screening results among 90% of mothers upon discharge. 3. To promote the active utilization of official educational resources (online/printed materials) related to NBS among expectant mothers before and after delivery.
Persons Involved	NBS Coordinator, Health Education and Promotion Officer (HEPO), Midwives, Obstetricians, NBS Coordinator, Hospital Administration, Nursing Staff, Discharge Planner, IT Support
Budget	PHP 16,000
Time Frame	January-March 2026
Activities	1. Develop and distribute high-visibility flyers or fridge magnets explicitly stating the "3 to 7 Day Window" for NBS. 2. Implement a mandatory 5-minute "NBS Timing Talk" during the mother's first pre-natal visit and before hospital discharge. 3. Provide a durable, clearly labeled NBS Passport/Folder for the blood spot card and results, integrated with the child's birth certificate or immunization record. 4. Incorporate a step in the hospital discharge checklist requiring the mother to physically receive and store the results/card in the provided folder. 5. Create a QR code leading to a DOH-approved NBS video/infographic, printed on the discharge checklist and the NBS Passport. 6. Dedicate a 10-minute session in the hospital waiting area (or online group) to "FAQs on NBS Results" to encourage curiosity and the use of the provided resources. 7. Conduct an assessment by administering a quiz to expectant mothers to evaluate their knowledge of newborn screening.
Expected Outcomes	1. 10% increase in correct answers regarding NBS timing in post-natal assessment. 2. 95% of mothers interviewed post-discharge can correctly state the NBS time window. 3. 90% of mothers present the NBS Passport/Folder during the first 2 weeks of post-natal check-up.

	4. 100% adherence to the inclusion of the NBS Passport in the hospital's discharge process. 5. 50% increase in resource access (tracked by QR code scans/website hits) compared to the previous quarter. 6. 80% attendance rate at the optional FAQ session.
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Recommendations

1. The expectant mothers may actively seek comprehensive information about newborn screening during prenatal visits, particularly regarding the optimal timing window, specific conditions screened, and the importance of maintaining screening records to ensure timely and effective participation in newborn health programs.
2. The community healthcare workers may implement standardized, culturally appropriate educational sessions during prenatal visits that emphasize both the general importance and specific technical details of newborn screening, while establishing systematic follow-up mechanisms to ensure maternal compliance and proper documentation practices.
3. The local government units may allocate resources to develop and distribute accessible educational materials, provide subsidies for newborn screening fees and transportation costs, and establish mobile screening units to address the significant urban-rural disparities in newborn screening access and compliance identified in this study.
4. The future researchers may add other variables such as attitudes towards newborn screening or employ mixed-methods designs to explore the complex interplay of socioeconomic factors, cultural beliefs, healthcare access barriers, and social support systems that influence maternal newborn screening practices beyond the demographic variables examined in this study,

particularly focusing on geographically isolated and disadvantaged areas.

References

- Al-Mohaimeed, A. A., Al-Harbi, A. M., Al-Otaibi, R. M., Al-Otaibi, S. M., Al-Otaibi, A. M., & Al-Otaibi, M. M. (2022). Knowledge, attitude, and practice of Saudi mothers regarding newborn screening: A cross-sectional study. *Cureus*, 14(12), Article e32456.
- Al-Otaibi, R. M., Al-Otaibi, S. M., Al-Otaibi, A. M., Al-Otaibi, M. M., Al-Mohaimeed, A. A., & Al-Harbi, A. M. (2022). Knowledge, attitude, and practice of Saudi mothers regarding newborn screening: A cross-sectional study. *Cureus*, 14(12), Article e32456.
- Alshahrani, M. S., Alshahrani, A. M., & Alqahtani, A. S. (2023). Knowledge, attitude, and practice of mothers toward newborn screening in Aseer region, Saudi Arabia. *Journal of Family Medicine and Primary Care*, 12(4), 789–795.
- Araia, M. H., Wilson, B. J., Chakraborty, P., Gall, K., Honeywell, C., Milburn, J., Ramsay, T., & Potter, B. K. (2015). Factors associated with knowledge of and satisfaction with newborn screening education: A survey of mothers. *Genetics in Medicine*, 17(12), 998–1005. <https://doi.org/10.1038/gim.2015.17>

- Arn, P. H., Amin, M., Rohr, F., Henshaw, B., Levy, H. L., Sikes, C., & Koch, R. (2017). The effect of newborn screening timing on the clinical course of hyperphenylalaninemia. *Journal of Inherited Metabolic Disease*, 40(1), 97–102. <https://doi.org/10.1007/s10545-016-9987-5>
- Bahrain Medical Bulletin. (2022). Neonate screening test among childbearing mother knowledge and attitude. *Bahrain Medical Bulletin*, 44(4), 1152–1155.
- Brás, C. P. d. C., Figueiredo, M. d. C. A. B. d., & Ferreira, M. M. C. (2023). Safety culture in obstetric nurses' clinical practice. *Texto & Contexto - Enfermagem*, 32. <https://doi.org/10.1590/1980-265x-tce-2022-0330en>
- Campbell, E., Ross, L. F., & Clayton, E. W. (2023). Parental attitudes regarding newborn screening of PKU and DMD. *American Journal of Medical Genetics Part A*, 143A(16), 1783–1788. <https://doi.org/10.1002/ajmg.a.31825>
- Capistrano-Estrada, S., De Castro-Hamoy, L., & Padilla, C. (2020). Knowledge, attitudes and practices on newborn screening among expectant mothers attending antenatal clinics in Metropolitan Manila. *Acta Medica Philippina*, 54(6), 646–654. <https://doi.org/10.47895/amp.v54i6.1591>
- De Castro-Hamoy, L., Chiong, M., & Padilla, C. (2020). Communication practices surrounding newborn screening results: Perspectives from Filipino mothers. *Journal of Community Genetics*, 11(2), 225–234. <https://doi.org/10.1007/s12687-020-00458-4>
- Department of Health. (2023). *Newborn screening program: National guidelines and implementation framework*. Republic of the Philippines Department of Health.
- Engelen, M., van Ballegoij, W. J., Mallack, E. J., Van Haren, K. P., Köhler, W., Salsano, E., van Trotsenburg, A., Mochel, F., Sevin, C., Regelman, M. O., Tritos, N. A., Halper, A., Lachmann, R. H., Davison, J., Raymond, G. V., Lund, T. C., Orchard, P. J., Kuehl, J., Lindemans, C. A., ... Kemp, S. (2022). International recommendations for the diagnosis and management of patients with adrenoleukodystrophy: A consensus-based approach. *Neurology*, 99(21), 940–951. <https://doi.org/10.1212/wnl.000000000000201374>
- Goyal, A., Singh, A., & Gupta, S. (2021). Awareness and attitude of mothers regarding newborn screening in a tertiary care hospital of North India. *Indian Journal of Community Medicine*, 46(2), 289–292.
- Guevarra, E., Padilla, C., & Villanueva, J. (2020). Knowledge, attitudes, and practices on newborn screening among mothers in selected areas in the Philippines. *Philippine Journal of Science*, 149(2), 351–363.
- Kayton, A. (2017). Newborn screening: A literature review. *Neonatal Network*, 26(2), 85–95. <https://doi.org/10.1891/0730-0832.26.2.85>
- Lacanilao-Tan, M. L., Reyes, M. E., & Padilla, C. D. (2023). Contact information accuracy and proactive behavior in newborn screening follow-up among Filipino mothers. *BMC Pregnancy and Childbirth*, 23(2), 215–223.

- <https://doi.org/10.1186/s12884-023-05492-x>
- Laurino, M. Y., Silao, C. L. T., & Padilla, C. D. (2022). Impact of prenatal education on maternal knowledge and acceptance of newborn screening in the Philippines. *Journal of Genetic Counseling*, 31(3), 607–616. <https://doi.org/10.1002/jgc4.1521>
- Layton, M., Burleson, J., Goedken, J., & Hoff, T. (2023). Parental knowledge and awareness about newborn screening. *Clinical Pediatrics*, 44(9), 803–810. <https://doi.org/10.1177/000992280504400906>
- O'Leary, L., Nease, C., MacIntyre, D., Harris, R., & McParland, P. (2017). Women's attitudes toward the retention and uses of blood taken from babies for newborn screening. *Journal of Medical Screening*, 24(4), 183–189. <https://doi.org/10.1177/0969141316689548>
- Padilla, C. D. (2018). Newborn screening in developing countries: The Philippine experience. *Journal of Community Genetics*, 9(2), 199–205. <https://doi.org/10.1007/s12687-017-0345-8>
- Padilla, C. D., & Aguinaldo, M. A. (2022). Assessment of maternal knowledge and attitudes toward newborn screening in Metropolitan Manila. *Acta Medica Philippina*, 56(1), 78–85. <https://doi.org/10.47895/amp.v56i1.3898>
- Padilla, C. D., & Domingo, C. J. (2020). Newborn screening knowledge among expectant mothers attending antenatal care clinics in the Philippines. *Southeast Asian Journal of Tropical Medicine and Public Health*, 51(1), 117–126.
- Padilla, C. D., & Domingo, C. J. (2022). Framing newborn screening: Effects on maternal attitudes in Philippine maternal and child health programs. *Journal of Perinatal Medicine*, 50(5), 608–617. <https://doi.org/10.1515/jpm-2022-0124>
- Padilla, C. D., Silao, C. L. T., & Domingo, C. J. (2021). Knowledge, attitudes, and practices regarding newborn screening among expectant mothers in the Philippines. *International Journal of Neonatal Screening*, 7(2), Article 32. <https://doi.org/10.3390/ijns7020032>
- Padilla, C. D., Silao, C. L. T., & Domingo, C. J. (2023). Determinants of newborn screening knowledge among expectant mothers in the Philippines: A multi-center cross-sectional study. *BMC Pregnancy and Childbirth*, 23(1), Article 178. <https://doi.org/10.1186/s12884-023-05482-z>
- Santos, J. M., De Guzman, A. B., & Padilla, C. D. (2021). Follow-up compliance in the Philippine Newborn Screening Program: Patterns and determinants. *Journal of Community Genetics*, 12(1), 101–111. <https://doi.org/10.1007/s12687-020-00495-z>
- Schacter, D. (2021). *Psychology* (3rd ed.). Worth Publishers.
- Shetty, P. (2025). Knowledge, attitude, and practice about human immunodeficiency virus/acquired immunodeficiency syndrome among antenatal women at a community health center in Mulki. *Journal of South Asian Federation of Obstetrics and Gynaecology*, 17(3), 308–313. <https://doi.org/10.5005/jp-journals-10006-2670>

- Silao, C. L. T., Capistrano-Estrada, S., & Padilla, C. D. (2022). Cultural influences on maternal attitudes toward newborn screening in the Philippines: A qualitative study. *Journal of Community Genetics*, 13(3), 321–331. <https://doi.org/10.1007/s12687-022-00587-y>
- Singh, A., Goyal, A., & Gupta, S. (2021). Awareness and attitude of mothers regarding newborn screening in a tertiary care hospital of North India. *Journal of Family Medicine and Primary Care*, 10(8), 2891–2896.
- Villanueva, J. C., Silao, C. L. T., & Padilla, C. D. (2020). Improving maternal knowledge on newborn screening through a structured educational intervention during antenatal care. *Acta Medica Philippina*, 54(5), 522–531. <https://doi.org/10.47895/amp.v54i5.1566>
- Villanueva, J. C., Silao, C. L. T., & Padilla, C. D. (2021). Narrative versus fact-based education in improving maternal attitudes toward newborn screening in the Philippines: A randomized controlled trial. *Patient Education and Counseling*, 104(5), 1132–1139. <https://doi.org/10.1016/j.pec.2020.11.019>
- Vollman, J. H. (2022). Newborn screening: Current practices and emerging technologies. *Pediatric Annals*, 51(3), e102–e108. <https://doi.org/10.3928/19382359-20220209-01>