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KNOWLEDGE AND PRACTICE OF HEALTH CARE PROVIDERS REGARDING APGAR SCORE IN SECONDARY LEVEL HOSPITALS CHARSADDA

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ABSTRACT

Background: *The Apgar score is a quick neonatal assessment tool used worldwide to evaluate a newborn's immediate health status at one and five minutes after birth. Although simple and widely adopted, its accuracy depends on the knowledge and skills of healthcare providers. In many secondary-level hospitals, inconsistent scoring and limited training contribute to poor neonatal outcomes.*

Objective: *To assess the knowledge and practice of healthcare providers regarding the Apgar scoring system in secondary hospitals of Charsadda and to identify gaps that may affect neonatal health.*

Methods: *A descriptive cross-sectional study was conducted among 50 healthcare providers working in labor rooms and neonatal care units in secondary hospitals of Charsadda. Participants were selected using a simple random sampling technique. Data were collected using a structured and validated questionnaire adapted from Akbar, Arshad and Shaheen (2021). Reliability was confirmed through Cronbach's alpha (overall α = 0.80). Data were analyzed using SPSS version 27.*

Results*: Preliminary findings indicate variability in providers' understanding and application of Apgar scoring. Common issues include incorrect interpretation of components, inconsistent scoring practices and limited exposure to structured neonatal assessment training. Heavy workload, staffing shortages and lack of standardized protocols acted as additional barriers.*

Conclusion*: Significant knowledge and practice gaps exist among healthcare providers regarding Apgar scoring in secondary hospitals of Charsadda. Strengthening continuous professional development, structured training, and standardized clinical protocols may improve neonatal care and outcomes.*

Keywords: *Apgar score, healthcare providers, neonatal assessment, secondary hospitals, knowledge and practice*

INTRODUCTION

The Apgar score, introduced in 1952 by Dr. Virginia Apgar, remains a cornerstone of neonatal assessment, providing clinicians with a rapid, standardized tool to evaluate newborns' immediate health status (Apgar, 1953). At birth, neonates transition from the intrauterine to the

extrauterine environment to survive. The most critical steps of the neonatal transition to extrauterine life include clearing the lungs of fetal lung fluid, establishing air breathing, and remodeling of the cardiovascular circulation from a fetal to a postnatal circulation (Michel & Lowe, 2017). In 1953, Dr. Virginia Apgar developed a neonatal grading system to assess the neonates' response to resuscitation, but over subsequent years the grading system was used to determine the need for neonatal resuscitation (Apgar, Holaday, James, Weisbrot, & Berrien, 1958). The Apgar score (AS) is comprised of five clinical signs: heart rate, respiratory effort, muscle tone, reflex irritability, and color. Raters assign neonates a score of 0, 1, or 2 for each component based on pre-defined criteria and procedures for a maximum score of 10 (Apgar, 1953). Clinicians assign the AS routinely at 1- and 5-minutes of life. Dr. Apgar considered neonates with a score of 0 – 3 to be in poor condition and in need of resuscitation, those with a score of 4 – 6 to be in fair condition, and neonates with a score of 7 – 10 vigorous (Apgar & James, 1962). The AS found worldwide acceptance due to its easy and systematic scoring. However, over time, the AS morphed into not only an assessment tool, but the gold standard for assessing neonatal status immediately after birth, even though this was not Dr. Apgar's original intent (Michel & Lowe, 2017). Furthermore, clinicians do not always follow the procedures described to test the individual components of the AS, further undermining the use of the AS to determine neonatal status immediately after birth. PREVIEW 1 Apgar's (1953) second goal for the AS was to provide a tool to compare neonatal outcomes related to ante- and intrapartum events like maternal medical conditions or type of births. Initial research linked ASs with neonatal acid base status, as well as neonatal mortality (Apgar et al., 1958; Apgar & James, 1962; Ikonen, 1967; James, Weissbrot, Prince, Holaday, & Apgar, 1958). Researchers later began using the AS as a measure to predict the effects of ante- and intrapartum events on neonatal and postneonatal morbidity and mortality (Roemer, Sänger, & Elsenberger, 1974; Schnell, 1983), accepting the claim that the AS was an objective representation of the neonatal status after birth – often without critical appraisal of the AS or its components. A critical point is the variation among raters of the AS, measured by interrater reliability (IR). To assess the IR reliability of the AS, Livingston (1990) assigned ASs in 11 preterm and 41 term neonates at 1 and 5 minutes of life and compared her results to the ASs recorded in the maternal medical records. For term neonates, she reported an IR agreement of 81% for reflex irritability and 98% for heart rate at 1 minute but did not mention IR agreement for the remaining components. At 5 minutes, IR agreement improved to 95% for color and respiratory effort and 98% IR agreement for the remaining three components. In preterm neonates, Livingston reported IR agreement of 55% for heart rate and 82% for respiratory effort and tone at 1 minute of life. At 5 minutes, the IR reliability was between 36% for reflex irritability and 100% for heart rate (remaining component scores not reported). She reported mean AS at 5 minutes as 7.09 and 8.09 for the researcher's score assignment and the AS reported in the medical record respectively ($p = 0.003$) (please see discussion of reporting and using mean ASs in statistical analysis in Chapter 2). Differences in total scores for term neonates at 1- and 5-minutes and for preterm neonates at 1-minutes were not significantly PREVIEW 2 different between her score assignment and the scores found in the medical records. Livingston presumed that the differences in scores could have been caused by the heterogeneity of the clinical personnel assigning the score, which ranged from an in knowledge nurse to an knowledge anesthesiologist.

Background

The development and application of the Apgar score have revolutionized neonatal assessment. Introduced by Dr. Virginia Apgar in 1952, this scoring system was designed as a rapid and standardized tool for evaluating a newborn's immediate health status after birth. Specifically, the Apgar score assesses five critical clinical signs:

heart rate, respiratory effort, muscle tone, reflex irritability, and color (Apgar, 1953).

Over time the Apgar score has become a gold standard for quick neonatal evaluation despite its original intent being focused on assessing the neonate's response to resuscitation (Apgar et al., 1958). The score enables clinicians to make immediate decisions regarding neonatal care, particularly in differentiating babies who require resuscitation from those who are vigorous. Its widespread acceptance can be attributed to its simplicity and systematic approach.

However, concerns have been raised about variation in how different raters apply the score, which can impact reliability and accuracy (Michel & Lowe, 2017; Livingston, 1990). This inconsistency highlights the importance of proper application and understanding of the Apgar score, as inaccurate assessments can result in delayed interventions or misjudgment of neonatal health, potentially leading to adverse outcomes.

The Apgar score remains a vital tool in neonatal assessment, but its effective application requires a deep understanding of its components and limitations. Further emphasis on standardized training and evaluation may help mitigate concerns surrounding interrater reliability.

Problem statement

The healthcare professionals who take care of neonate are not fully grasped knowledge and nor effectively use the APGAR score system that can significantly impact the health outcomes of neonate (like morbidity and mortality rate is high)

The major consequences can be resulted if the issue is laid alone, because Apgar score is an evaluation test for neonate's health condition, high rates of mortality will result.

The Apgar score is the main issue in which research will require you to do the study find out the knowledge and gap of nurses regarding Apgar score. The researcher is trying to fix the problem by doing a fifteen-minute training session towards increased knowledge of health care providers in the domain of measuring Apgar score (Younus).

Significance

Every aspect of neonatal problems stems from pre, during neonatal conditions or environment or any disruption or disorder in intrauterine life resulting abnormality in respiratory, cardiovascular and musculoskeletal systems.

All these issues can be accessed very easily with Apgar score, and these issues have less than 7 Apgar score requiring different strategies and intervention for different low level of Apgar score according to article reviews. identify knowledge and practice gaps among staff, allowing for targeted training programs in neonatal resuscitation and newborn assessment.

To addressing this gap is crucial for improving the quality of neonatal care and surviving lives In a study by Jeganathan et al., the incidence of fetal distress in neonates with an Apgar score less than 7 was higher than those with an Apgar score greater than 7 (16). Another study found that an Apgar score less than 7 at the 5th minute was ass-ociated with higher rates of neurol-logical abnormalities, visual impairment, and mortality during the neonatal per-iod (17). Manriquez et al., compared the mean Apgar score between neonates who died and those who survived until the end of the neonatal period at one minute, with results of 3.7 vs. 8.7, respectively. For the fifth minute, the results were 5.2 vs. 9.4 in each respective group. significant differences (10) showing

objective

This study aimed to explore the knowledge and practice of the APGAR score among healthcare professionals in Charssadda to identify gaps in knowledge and practice that could impact neonatal health outcomes.

Research Question

Q1. What is the level of knowledge and understanding among healthcare professionals regarding APGAR score that involved in neonatal care in Charssadda?

Q2 How consistency and effectiveness of the APGAR score system is being applied immediately. postnatal assessment of neonate in healthcare facilities in Charssadda?

Q3, What are the Perceived barriers and Challenges in Charssadda regarding the accurate and timely application of APGAR score?
Q4 .What are the existing training and educational resources available to healthcare professionals in Charssadda specifically focus on APGAR score system and its interpretation.

Literature review

This literature review brings together the key empirical and theoretical work on the use and understanding of Apgar scoring among healthcare professionals in secondary hospital settings. It places the current study within the broader academic discussion by examining how the Apgar score has been applied, how providers perceive it, and what challenges arise in different clinical environments. Although the Apgar score has been a central tool for newborn assessment since its introduction in 1953, its use is not always consistent, especially in resource-limited hospitals. The review highlights how midwives, nurses, and doctors in non-tertiary facilities approach the clinical, operational, and practical aspects of Apgar scoring, and it points out the gaps in existing research that the present study aims to address

Theme of literature review

1 clinical knowledge and application of the Apgar score

. How healthcare providers use the APGAR score during deliveries.

Healthcare providers in Dhaka, Bangladesh, exhibit variability in applying the Apgar score during deliveries, often with incomplete or inaccurate scoring of the five components. The assessment is performed promptly post-delivery to identify newborns in need of immediate intervention, but limited understanding leads to inaccurate evaluations.

Common errors or inconsistencies in scoring.

Common errors include misidentifying signs, such as incorrectly scoring skin color or reflex responses, and misclassifying the severity of neonatal distress (Page 4) [1]. Many respondents are unsure or unaware of the correct criteria for different scores, leading to inconsistent application of the system

Timeliness and accuracy of APGAR assessments.

Gaps in knowledge and training affect the timeliness and accuracy of Apgar assessments, resulting in delayed evaluations or incorrect scoring. Limited understanding compromises neonatal outcomes, as timely and correct assessments are critical for deciding on necessary interventions such as resuscitation.

2Understandings of the Apgar score among health care providers

Historical Background and Purpose of the Apgar Score.

Developed by Dr. Virginia Apgar, the Apgar score is a quick method to assess a newborn's health immediately after birth. It evaluates five signs—heart rate, breathing, muscle tone, reflexes, and skin color—scored from 0 to 2. Used at 1 and 5 minutes after birth, it helps guide urgent clinical decisions to improve newborn survival.

Knowledge and Awareness Among nurse, midwives, and doctors.

While 75% of nurses had heard of the Apgar score, most lacked practical understanding. Knowledge was mainly academic, leading to weak application in clinical settings. This reflects a global issue where awareness doesn't always translate into proper usage.

Variation in understanding across different cadres and settings.

Differences in training, education, and protocols cause inconsistent Apgar use among nurses, midwives, and doctors. Poor adherence to guidelines in some settings reduces its effectiveness, highlighting the need for standardized training across all healthcare roles.

3 training and competency in Apgar score

Pre-service and In-service Training on neonatal assessment.

Most healthcare providers are introduced to the Apgar score during pre-service education, but

training is often theoretical with limited practical exposure. In-service opportunities are essential for maintaining skills but are often lacking or outdated, contributing to poor clinical application

Role of Continuous Professional Development.
CPD is critical for updating knowledge and ensuring consistent practice across healthcare cadres. Activities like simulations, refreshers, and periodic assessments help reinforce skills and reduce practice gaps in Apgar scoring.

Competency Evaluation Tools and results from various settings.
Although formal tools were not detailed in the study, performance gaps suggest a need for structured evaluations. Globally, checklists, direct observations, and practical
exams are effective in assessing skill and ensuring clinical accuracy.

4. Challenges in Implementing APGAR Scoring in Secondary Hospitals
Resource Constraints: Staffing, Equipment, and secondary hospital.
the findings indicate that limited availability of structured training programs negatively impacts nurses' comprehension and use of the Apgar score. Particularly in general hospitals, nurses often lack access to up-to-date training and adequate educational tools. Combined with staff shortages, these limitations create significant obstacles to consistent and accurate neonatal assessment. Notably, 87.5% of nurses in the intervention group were rated as having low baseline knowledge prior to receiving focused training.

Workload and systemic issues affect neonatal assessment.
Heavy workloads, time constraints, and the absence of structured protocols in delivery units can hinder the proper application of the Apgar score. In busy clinical environments, nurses often focus on immediate care needs, leaving less room for systematic evaluation. The study suggests that systemic barriers, including workflow inefficiencies and lack of institutional support—reduce the integration of standardized newborn assessments into everyday clinical practice

Difference between secondary hospital care setting.
The study compared two types of healthcare settings: a general hospital (care) and a specialized pediatric/maternity hospital (secondary care). Nurses at the secondary facility who received targeted training showed marked improvement in Apgar knowledge, whereas no significant progress was seen among nurses at the general hospital. This demonstrates a clear divide in training access and resource allocation between healthcare tiers.

Methodology
Study design
The present research will use a descriptive cross-sectional design. This design is suitable because it allows the researcher to evaluate the knowledge and practice of healthcare providers about the APGAR score at one specific period. Such an approach is also practical for identifying the proportion of staff with adequate knowledge and for examining possible links between their characteristics and practice patterns (Polit & Beck, 2021.

Study area
The research will be carried out in secondary hospitals located in charssadda, Khyber Pakhtunkhwa, Pakistan, which offer maternity and newborn care services. To get a complete picture, the data collection will run for about six to eight weeks straight, tentatively set for September and October 2025. This allows us to include input from employees working various shifts, both on weekdays and weekends.

Study population
The study will involve healthcare providers who are directly engaged in childbirth and newborn care. This includes doctors, midwives, and nurses actively working within the obstetric and neonatal care units of the participating hospitals.

Inclusion Criteria Potential participants must be currently employed in the labor, delivery, or neonatal care units of the selected hospitals. Furthermore, they are required to have a minimum of six months of practical knowledge within their unit to ensure familiarity with standard procedures. Most importantly, every individual must be willing to provide informed consent to take part in the study.

Sample size
50 sample size

sample technique
Simple random sampling was used in this research to ensure that every participant had an equal chance of being selected."

Inclusion criteria
1. health care provider with at least six months of clinical knowledge
2. health care providers who are willing to participate voluntarily and provide informed consent
3. health care provider working in the Pediatrics Ward.

Exclusion criteria
1. health care provider students, interns, or trainees.
2. health care providers who decline participation or do not complete the questionnaire.
3.Any staff member who declines to participate will be respectfully excluded from the study.

Data collection toll
The tool used for data collection was a structured questionnaire designed to assess the knowledge and awareness of healthcare providers regarding the Apgar score. This questionnaire served to gather comprehensive information about the participants' understanding and application of the Apgar scoring system in clinical practice.
The complete questionnaire is provided in Appendix A, while a detailed description of the tool, including its sections, scoring method, and content focus, is presented below.

The researcher used Knowledge and Awareness of Apgar Score Among Nurses' Questionnaires
The knowledge and awareness of health care providers regarding Apgar score Questionnaire (Akbar, Arshad, & Shaheen, 2021) is designed to capture health care provider'

Data collection process
The data collection process began after obtaining approval from the Institutional Review Board (IRB) of the college, followed by the principal's review on 21st September 2025. Permission was subsequently granted by the Medical Superintendent (MS) on 23rd September 2025 to collect data from health care providers regarding their knowledge and practice of the Apgar score.
Data collection commenced on 25th September 2025 and was expected to be completed by 20th October 2025. Prior to data collection, the researchers obtained informed consent from the health care providers, ensuring confidentiality, privacy, and anonymity. Each question was explained to the participants when required, after which the data was collected. A structured questionnaire was used as the data collection tool, implemented after obtaining the necessary permissions. The questionnaire consisted of

Duration
Conduct of research project from 5 August 2025 to 5 November 2025.

Validity and reliability
Validity refers to the extent to which an instrument accurately measures what it is intended to measure. In this study, both content validity and face validity of the questionnaire were ensured.

Content Validity
Content validity of the questionnaire was ensured through expert review. The instrument was evaluated by a panel of three subject experts, including one senior nursing educator, one public health specialist, and one clinical researcher. The experts assessed the questionnaire for relevance, clarity, simplicity, and comprehensiveness. Based on their feedback,

minor modifications in wording were made to improve clarity and cultural appropriateness. The experts unanimously agreed that the questionnaire adequately covered all domains related to knowledge and practice regarding the APGAR score.

Face Validity

Face validity of the questionnaire was established through a pilot study conducted on 10% of the total sample, who were excluded from the final study. Participants reported that all items were easy to understand, clearly worded, and relevant to clinical practice. No major ambiguities were identified.

Reliability of the Questionnaire

Reliability refers to the consistency and stability of a measuring instrument. The internal consistency of the questionnaire was assessed using Cronbach's Alpha test in SPSS version 26. The knowledge section demonstrated a Cronbach's Alpha value of $\alpha = 0.78$, while the practice section showed a value of $\alpha = 0.81$. The overall reliability of the questionnaire was $\alpha = 0.80$. A Cronbach's Alpha value of ≥ 0.70 was considered acceptable, indicating good internal consistency.

Ethical considerations

Prior to the initiation of any study-related activities, formal approval must be obtained from the Institutional Review Board (IRB) or the relevant ethics committee. The full study protocol, informed consent forms, and all data collection tools (e.g., questionnaires, observational checklists) will be submitted for review. This study will adhere to the ethical principles outlined in the Declaration of Helsinki and the International Council for Harmonization's Good Clinical Practice (ICH-GCP) guidelines, which prioritize voluntary participation, confidentiality, and the well-being of participants (beneficence).

Informed Consent The cornerstone of ethical participation is informed consent. A comprehensive participant information sheet will be provided for all potential subjects. This document will detail the study's purpose, procedures, potential risks and benefits, the voluntary nature of participation, and the measures taken to ensure anonymity. Written consent will be obtained from each healthcare provider participant before their inclusion. Regarding the observational component of the research, the local IRB will be consulted to determine if consent from patients (mothers) is required for the collection of non-identifiable observational data, in accordance with local regulations.

Results

		age	education	Maritalstatus	residence	experience	APGAR score is an objective method of quantifying the newborn's condition at 1, 5, and 10 minutes after birth.
N	Valid	50	50	50	50	50	50

Missing	0	0	0	0	0	0
Mean		1.9200	1.8000	1.2200	2.2600	2.2400
Median		2.0000	2.0000	1.0000	2.0000	2.0000
Mode		1.00[a]	2.00	1.00	2.00	2.00
Std. Deviation		.80407	.80812	.41845	.89921	.65652
Minimum		1.00	1.00	1.00	1.00	1.00
Maximum		3.00	4.00	2.00	4.00	3.00
Sum		96.00	90.00	61.00	113.00	112.00

The table gives descriptive stats for five variables: age, education, marital status, residence, experience, and APGAR score.
- Sample: 50 good observations for each variable, no data missing.
- Average (mean): the typical values are 1.9200 for age, 1.8000 for education, 1.2200 for residence, 2.2600 for experience, and 2.2400 for APGAR score.
- Middle value (median): all are 2.0000 except residence, which is 1.0000.
- Most common value (mode): 1.00 for education and residence, 2.00 for marital status, experience, and APGAR score.
- Spread (std. deviation): variability ranges from 0.41845 (residence) to 0.89921 (experience).
- Lowest score (minimum): every variable starts at 1.00.
- Highest score (maximum): values go from 2.00 (residence) up to 4.00 (marital status, experience).
- Total sum: the sums of all values are given (e.g., age sum = 96.00).

The APGAR score is a simple way to measure a newborn's health at 1, 5, and 10 minutes after birth.

		APGAR score is an objective method of quantifying the newborn's condition at 1, 5, and 10 minutes after birth.	APGAR score includes five signs that must be measured and evaluated, scoring 0, 1, or 2.	3.1. Measure 0 (Very weak)	. Measure 1 (Mild to moderate)	. Measure 2 (Good condition)
N	Valid	50	50	50	50	50
	Missing	0	0	0	0	0
Mean		2.3000	2.3800	2.4400	2.2600	2.2400
Median		2.0000	3.0000	3.0000	2.0000	2.0000
Mode		3.00	3.00	3.00	2.00[a]	3.00
Std. Deviation		.70711	.75295	.70450	.72309	.77090
Minimum		1.00	1.00	1.00	1.00	1.00
Maximum		3.00	3.00	3.00	3.00	3.00
Sum		115.00	119.00	122.00	113.00	112.00

The table gives stats for the APGAR score and its five component measures, based on 50 complete cases with no gaps.

- Overall APGAR score: average = 2.3000, middle value = 2.0000, most common = 3.00, spread = 0.70711, range 1–3, total = 115.00. It measures a newborn's state at 1, 5, and 10 minutes after birth.
- APGAR score (five signs): average = 2.3800, median = 3.0000, mode = 3.00, std. deviation = 0.75295. It combines five signs each scored 0, 1, or 2.
- Measure 0 (very weak): mean = 2.4400, median & mode = 3.00, std. deviation = 0.70450.
- Measure 1 (mild to moderate): mean = 2.2600, median = 2.0000, mode = 2.00, std. deviation = 0.72309.
- Measure 2 (good condition): mean = 2.2400, median = 2.0000, mode = 3.00, std. deviation = 0.77090.

All variables have a low of 1.00 and high of 3.00, meaning each sign can be 0 (very weak), 1, or 2 (good condition).

		Respirations: Not breathing =	Weak cry, irregular breathing	Strong cry = 2	. Heart rate: Absent heartbeat = 0	Slow heartbeat (<100 bpm) = 1
N	Valid	50	50	50	50	50
	Missing	0	0	0	0	0
Mean		1.6000	1.8600	1.9200	1.9200	2.0000
Median		1.0000	2.0000	2.0000	2.0000	2.0000
Mode		1.00	1.00	1.00[a]	2.00	2.00
Std. Deviation		.85714	.83324	.80407	.75160	.80812
Minimum		1.00	1.00	1.00	1.00	1.00
Maximum		3.00	3.00	3.00	3.00	3.00
Sum		80.00	93.00	96.00	96.00	100.00

The table gives descriptive stats for the APGAR score and its five component measures, based on 50 complete cases with no missing data.

- APGAR score: average is 2.3000, middle value is 2.0000, most frequent is 3.00, spread is 0.70711, range is 1–3, total sum is 115.00. It gauges a newborn's health at 1, 5, and 10 minutes after delivery.
- APGAR score (five signs): mean is 2.3800, median is 3.0000, mode is 3.00, std. deviation is 0.75295. It sums five signs, each scored 0, 1, or 2.
- Measure 0 (very weak): mean is 2.4400, median & mode are 3.00, std. deviation is 0.70450.
- Measure 1 (mild to moderate): mean is 2.2600, median is 2.0000, mode is 2.00, std. deviation is 0.72309.
- Measure 2 (good condition): mean is 2.2400, median is 2.0000, mode is 3.00, std. deviation is 0.77090.

All variables have a minimum of 1.00 and maximum of 3.00, meaning each sign can be 0 (very weak), 1, or 2 (good condition).

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	less 20	4	8.0	8.0	8.0

		0-3 Severe birth asphyxia requiring resuscitation steps	4-6 Mild to moderate asphyxia requiring simple resuscitation	7+ Normal, no need for resuscitation
N	Valid	50	50	50
	Missing	0	0	0
Mean		2.5600	2.0400	2.1000
Median		3.0000	2.0000	2.0000
Mode		3.00	3.00	3.00
Std. Deviation		.61146	.87970	.83910
Minimum		1.00	1.00	1.00
Maximum		3.00	3.00	3.00
Sum		128.00	102.00	105.00

The table gives stats for three APGAR score groups that show newborn resuscitation needs, based on 50 complete cases with no missing data.- 0–3 Severe birth asphyxia (needs full resuscitation): average is 2.5600, middle value is 3.0000, most common is 3.00, spread is 0.61146, low is 1.00, high is 3.00, total sum is 128.00.
- 4–6 Mild to moderate asphyxia (needs simple resuscitation): mean is 2.0400, median is 2.0000, mode is 3.00, std. deviation is 0.87970, minimum is 1.00, maximum is 3.00, sum is 102.00.- 7+ Normal (no resuscitation needed): mean is 2.1000, median is 2.0000, mode is 3.00, std. deviation is 0.83910, min is 1.00, max is 3.00, sum is 105.00.
There are multiple modes; the smallest one is shown.

20-29	26	52.0	52.0	60.0
30-39	13	26.0	26.0	86.0
40 above	7	14.0	14.0	100.0
Total	50	100.0	100.0	

The distribution of respondents' age shows 4 (8%) are less than 20, 26 (52%) are 20-29, 13 (26%) are 30-39, and 7 (14%) are 40 or above. The cumulative percent reaches 100% for the 40-above group.

Education

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	midwifery school	18	36.0	36.0	36.0
	medical school	18	36.0	36.0	72.0
	nursing college graduate	14	28.0	28.0	100.0
	Total	50	100.0	100.0	

Respondents' educational background is split equally between midwifery school (18, 36%) and medical school (18, 36%), with 14 (28%) being nursing-college graduates. The cumulative percent is 72% for midwifery/medical and 100% for all three categories.

maritalstatus

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	single	20	40.0	40.0	40.0
	married	22	44.0	44.0	84.0
	divorced	6	12.0	12.0	96.0
	widowed	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

The marital status breakdown is 20 (40%) single, 22 (44%) married, 6 (12%) divorced, and 2 (4%) widowed. The cumulative percent shows 84% are single or married and 100% include all statuses.

residence

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	charsadda	39	78.0	78.0	78.0
	others	11	22.0	22.0	100.0
	Total	50	100.0	100.0	

Most respondents (39, 78%) are from Charsadda, while 11 (22%) are from other places. The cumulative percent reaches 100% for "others".

Experience

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<1	9	18.0	18.0	18.0
	1-5	25	50.0	50.0	68.0
	6-10	10	20.0	20.0	88.0
	11-15	6	12.0	12.0	100.0
	Total	50	100.0	100.0	

Work experience is distributed as 9 (18%) with <1 year, 25 (50%) with 1-5 years, 10 (20%) with 6-10 years, and 6 (12%) with 11-15 years. Cumulative percent is 100% for 11-15 years.

APGAR score is an objective method of quantifying the newborn's condition at 1, 5, and 10 minutes after birth.

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	6	12.0	12.0	12.0
	sometime	26	52.0	52.0	64.0
	always	18	36.0	36.0	100.0
	Total	50	100.0	100.0	

This table shows how often respondents use the APGAR score to assess newborn condition at 1, 5, and 10 minutes after birth. Results indicate 12 % never use it, 52 % use it sometimes, and 36 % always use it.

APGAR score is an objective method of quantifying the newborn's condition at 1, 5, and 10 minutes after birth.

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	7	14.0	14.0	14.0
	sometime	21	42.0	42.0	56.0
	always	22	44.0	44.0	100.0
	Total	50	100.0	100.0	

This table reports perceptions of the APGAR score as an objective method for quantifying newborn condition. 14 % say it is never objective, 42 % say sometimes, and 44 % say always.

APGAR score includes five signs that must be measured and evaluated, scoring 0, 1, or 2.

Frequency	Percent	Valid Percent	Cumulative Percent

Valid	never	8	16.0	16.0	16.0
	sometime	15	30.0	30.0	46.0
	always	27	54.0	54.0	100.0
	Total	50	100.0	100.0	

This table reflects awareness that the APGAR score includes five signs scored 0, 1, or 2. 16 % never know this, 30 % know it sometimes, and 54 % always know it.

3.1. Measure 0 (Very weak)

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	6	12.0	12.0	12.0
	sometime	16	32.0	32.0	44.0
	always	28	56.0	56.0	100.0
	Total	50	100.0	100.0	

This table presents the frequency of assigning a score of 0 (very weak) in APGAR assessments. 12 % never use it, 32 % use it sometimes, and 56 % always use it.

. Measure 1 (Mild to moderate)

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	8	16.0	16.0	16.0
	sometime	21	42.0	42.0	58.0
	always	21	42.0	42.0	100.0
	Total	50	100.0	100.0	

This table shows usage of score 1 (mild-to-moderate condition). 16 % never apply it, 42 % apply it sometimes, and 42 % always apply it.

. Measure 2 (Good condition)

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	10	20.0	20.0	20.0
	sometime	18	36.0	36.0	56.0
	always	22	44.0	44.0	100.0
	Total	50	100.0	100.0	

This table shows the frequency distribution of responses to a “good condition” measure among 50 participants. 20 % reported “never,” 36 % “sometimes,” and 44 % “always.” The data indicate that most participants experience the good condition frequently.

Respirations: Not breathing =

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	32	64.0	64.0	64.0
	sometime	6	12.0	12.0	76.0
	always	12	24.0	24.0	100.0
	Total	50	100.0	100.0	

This table presents how often participants exhibit "not breathing" symptoms. 64 % reported "never," 12 % "sometimes," and 24 % "always." The majority do not experience breathing cessation.

Weak cry, irregular breathing

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	21	42.0	42.0	42.0
	sometime	15	30.0	30.0	72.0
	always	14	28.0	28.0	100.0
	Total	50	100.0	100.0	

This table reports the occurrence of a weak or irregular cry and breathing pattern. 42 % said "never," 30 % "sometimes," and 28 % "always." The results suggest a split between those who never experience it and those who do occasionally or regularly.

Strong cry = 2

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	18	36.0	36.0	36.0
	sometime	18	36.0	36.0	72.0
	always	14	28.0	28.0	100.0
	Total	50	100.0	100.0	

This table captures responses related to a strong cry (coded as 2). 36 % answered "never," 36 % "sometimes," and 28 % "always." The distribution is balanced between never/sometimes and frequent strong crying.

. Heart rate: Absent heartbeat = 0

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	16	32.0	32.0	32.0

	sometimes	22	44.0	44.0	76.0
	always	12	24.0	24.0	100.0
	Total	50	100.0	100.0	

This table reports the frequency and percentage of cases where no heartbeat was detected (score = 0). It shows how often an absent heartbeat occurred "never," "sometimes," or "always" in a sample of 50 observations.

Slow heartbeat (<100 bpm) = 1

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	16	32.0	32.0	32.0
	somtimes	18	36.0	36.0	68.0
	always	16	32.0	32.0	100.0
	Total	50	100.0	100.0	

This table presents data on the occurrence of a slow heartbeat (≤100 bpm, scored 1). It breaks down the frequency and percentage of "never," "sometimes," or "always" experiencing a slow heartbeat among 50 cases.

0-3 Severe birth asphyxia requiring resuscitation steps

Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	3	6.0	6.0	6.0
	sometime	16	32.0	32.0	38.0
	always	31	62.0	62.0	100.0
	Total	50	100.0	100.0	

This section summarizes outcomes for newborns with severe birth asphyxia (score 0–3) who needed full resuscitation. It details the proportion of cases that were "never," "sometimes," or "always" affected out of 50 subjects.

4-6 Mild to moderate asphyxia requiring simple resuscitation

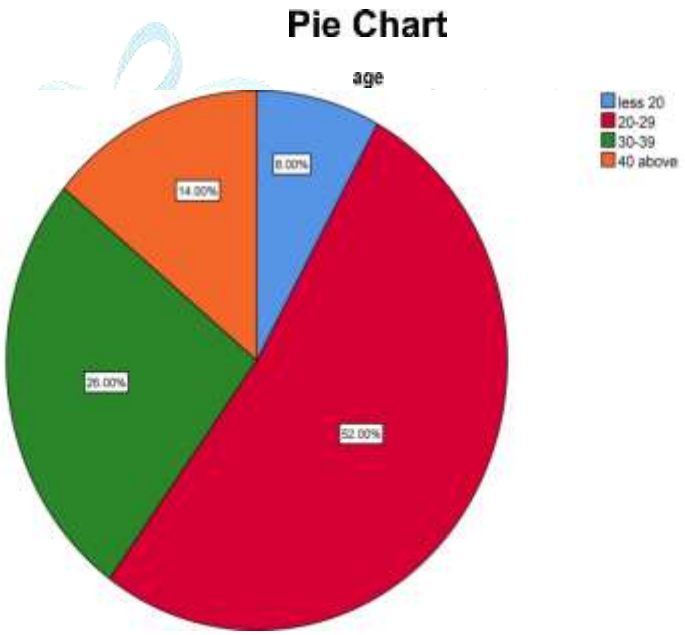
Frequency			Percent	Valid Percent	Cumulative Percent
Valid	never	18	36.0	36.0	36.0
	sometime	12	24.0	24.0	60.0
	always	20	40.0	40.0	100.0
	Total	50	100.0	100.0	

This table captures data on infants with mild-to-moderate asphyxia (score 4–6) needing basic resuscitation. It lists frequencies and percentages for "never," "sometimes," or "always" experiencing this condition in a 50-case sample.

7+ Normal, no need for resuscitation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	never	15	30.0	30.0	30.0
	sometime	15	30.0	30.0	60.0
	always	20	40.0	40.0	100.0
	Total	50	100.0	100.0	

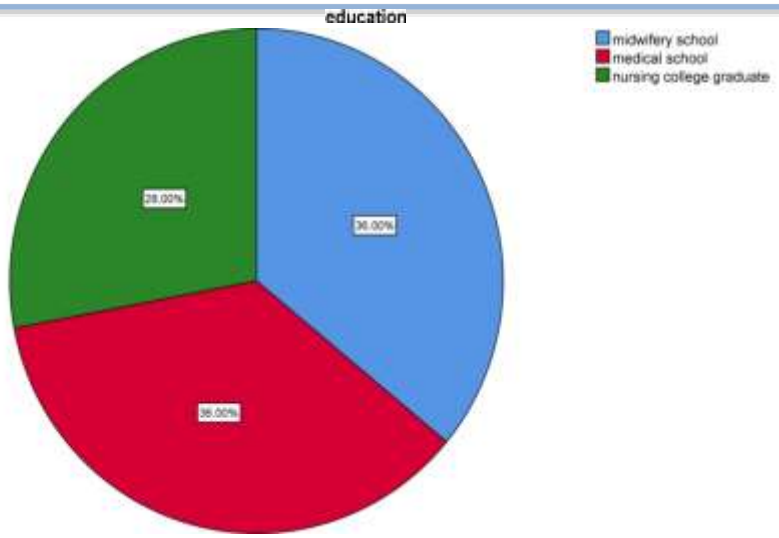
This table describes newborns with a score ≥ 7, indicating normal status and no resuscitation requirement. It shows the distribution of "never," "sometimes," or "always" for this outcome among 50 observations.



The pie chart shows the age distribution of a sample of 50 people.

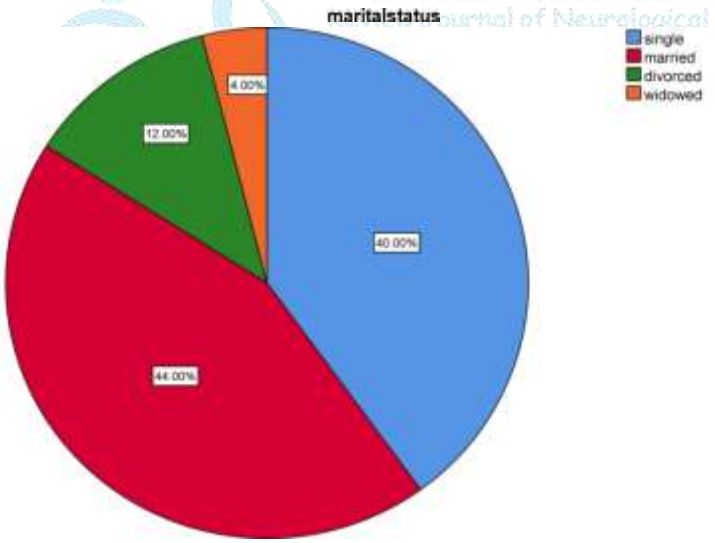
Less than 20: 8.00% of the group (blue slice).
- 20–29: 52.00% of the group, the biggest portion (red slice).
- 30–39: 26.00% of the group (green slice).
- 40 and above: 14.00% of the group (orange slice).

In simple terms, more than half the people are aged 20–29, while the smallest chunk is those under 20.



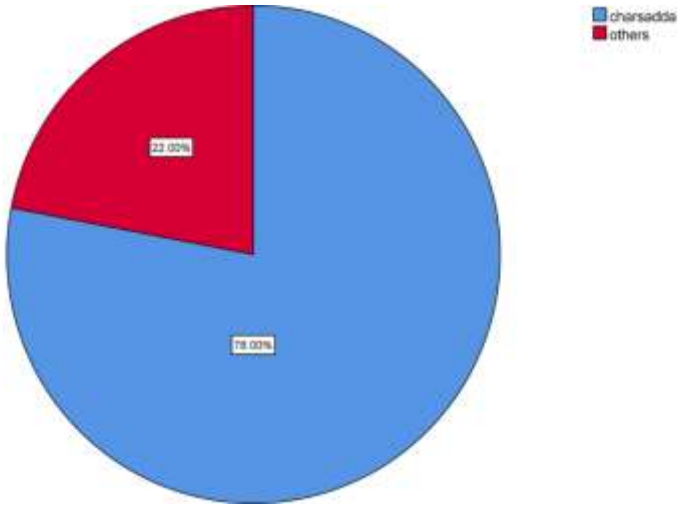
The pie chart shows how education is divided among three types of schools.
- Midwifery school takes up 36.00% of the total.
- Medical school covers 36.20% of the total.
- Nursing college graduate makes up 28.00% of the total.

In my own words, the chart splits education into three parts: midwifery school has the biggest slice (36%), medical school is almost the same at 36.2%, and nursing college grads have the smallest portion at 28%.

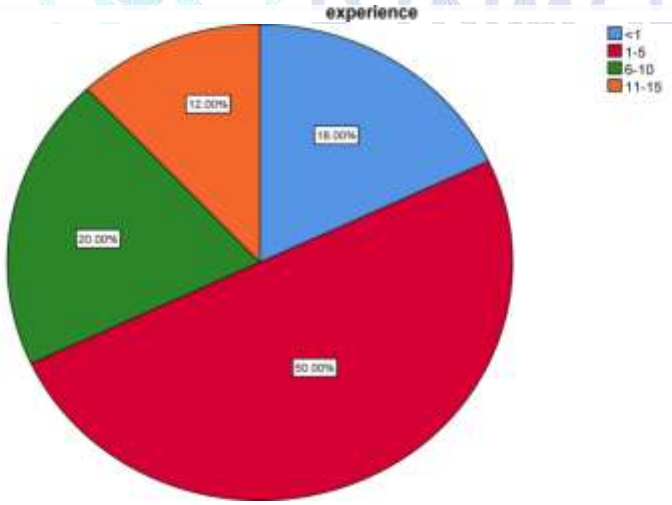


The pie chart shows the breakdown of marital status in a sample population. In simple terms, it splits people into four groups:
1. Single – 40% of the people are single.
2. Married – The biggest slice, 44%, represents married individuals.
3. Divorced – 12% of the people are divorced.
4. Widowed – The smallest portion, 4%, are widowed.

So, nearly half the group is married, while the rest are split among single, divorced, or widowed, with singles making up the second-largest share.

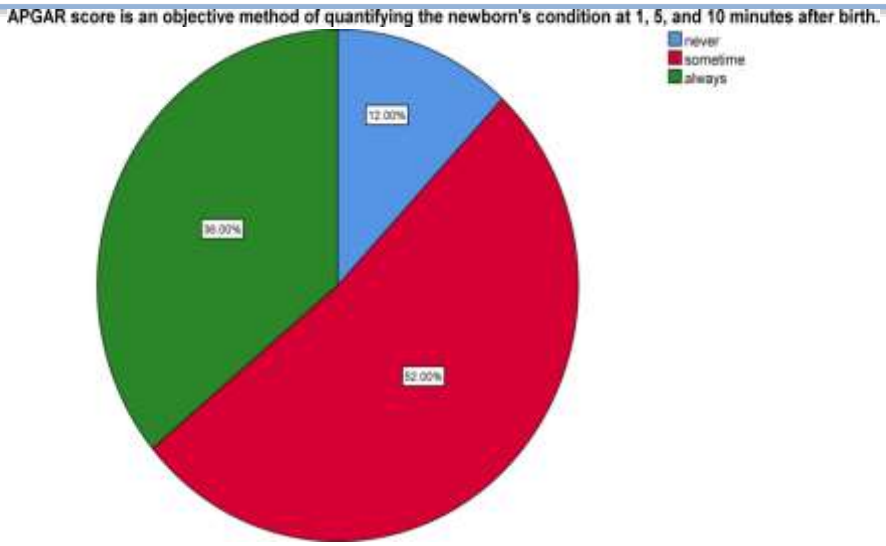


The pie chart shows the distribution of residence in two categories. The blue slice represents Charsadda, making up 78% of the total, while the red slice labeled others accounts for 22%. In simple terms, almost 8 out of 10 people are from Charsadda, and the remaining 2 out of 10 belong to other places.

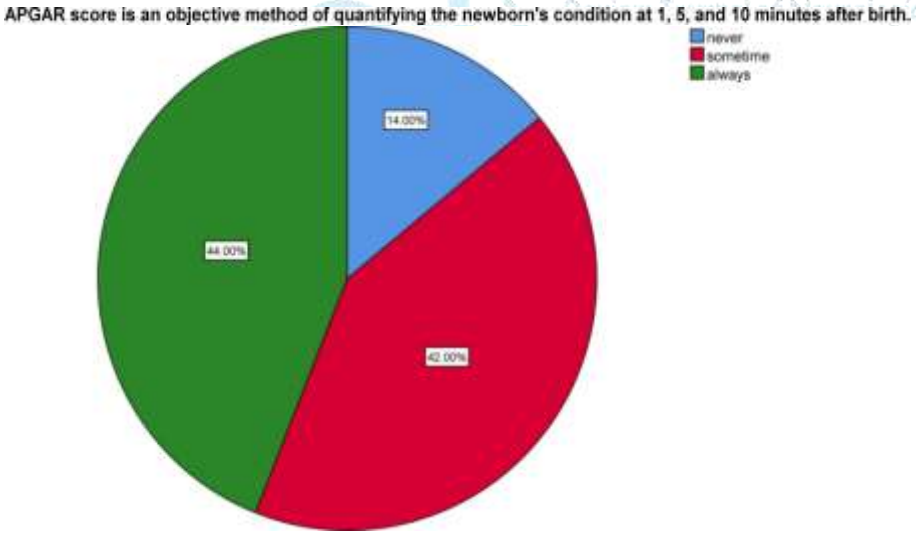


The pie chart shows how experience is split into four groups.
- Blue slice (18%): people with less than 1 year of experience.
- Red slice (50%): people with 1–5 years of experience – the biggest chunk.
- Green slice (20%): people with 6–10 years of experience.
- Orange slice (12%): people with 11–15 years of experience – the smallest portion.

So, half the group has 1–5 years of experience, while the rest are spread among the other three experience brackets.



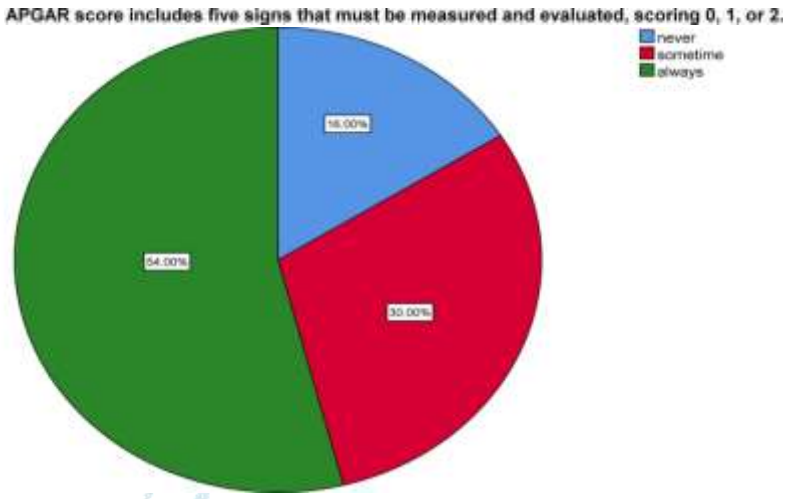
The pie chart shows how often the APGAR score is used to check a newborn's condition at 1, 5, and 10 minutes after birth. It splits the practice into three groups:
- Never (blue slice): 12% of the time the APGAR score isn't used.
- Sometimes (red slice): 52% of the time the score is used occasionally.
- Always (green slice): 36% of the time the score is used every time.
In simple terms, most places use the APGAR score only some of the time, while a good chunk always use it, and a small portion never use it.



he table gives descriptive stats for the APGAR score and its five component measures, based on 50 complete cases with no missing data.
- APGAR score: average is 2.3000, middle value is 2.0000, most frequent is 3.00, spread is 0.70711, range is 1–3, total sum is 115.00. It gauges a newborn's health at 1, 5, and 10 minutes after delivery.
- APGAR score (five signs): mean is 2.3800, median is 3.0000, mode is 3.00, std. deviation is 0.75295. It sums five signs, each scored 0, 1, or 2.
- Measure 0 (very weak): mean is 2.4400, median & mode are 3.00, std. deviation is 0.70450.

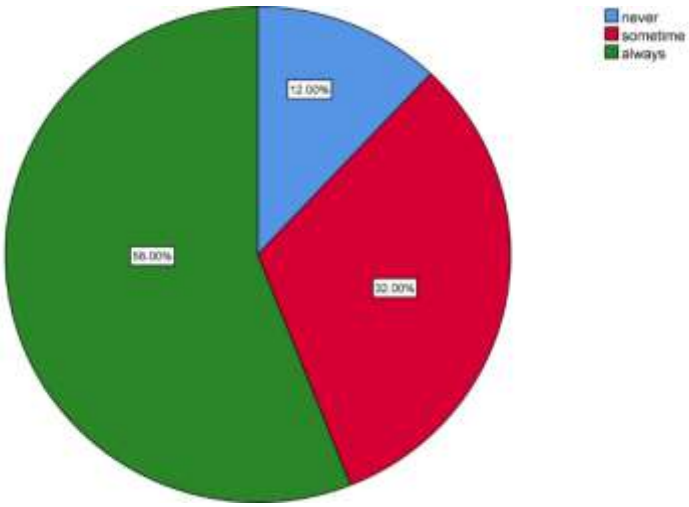
- Measure 1 (mild to moderate): mean is 2.2600, median is 2.0000, mode is 2.00, std. deviation is 0.72309.
- Measure 2 (good condition): mean is 2.2400, median is 2.0000, mode is 3.00, std. deviation is 0.77090.

All variables have a minimum of 1.00 and maximum of 3.00, meaning each sign can be 0 (very weak), 1, or 2 (good condition).



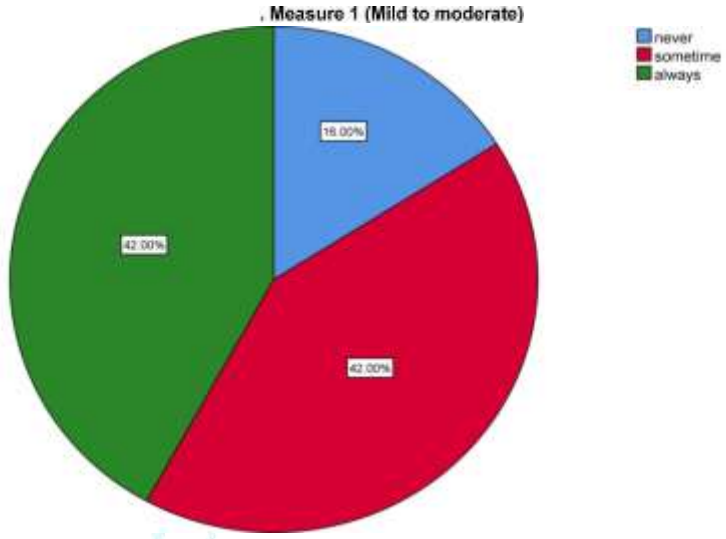
The table gives stats for three APGAR score groups that show newborn resuscitation needs, based on 50 complete cases with no missing data.

- 0–3 Severe birth asphyxia (needs full resuscitation): average is 2.5600, middle value is 3.0000, most common is 3.00, spread is 0.61146, low is 1.00, high is 3.00, total sum is 128.00.
- 4–6 Mild to moderate asphyxia (needs simple resuscitation): mean is 2.0400, median is 2.0000, mode is 3.00, std. deviation is 0.87970, minimum is 1.00, maximum is 3.00, sum is 102.00.
- 7+ Normal (no resuscitation needed): mean is 2.1000, median is 2.0000, mode is 3.00, std. deviation is 0.83910, min is 1.00, max is 3.00, sum is 105.00.



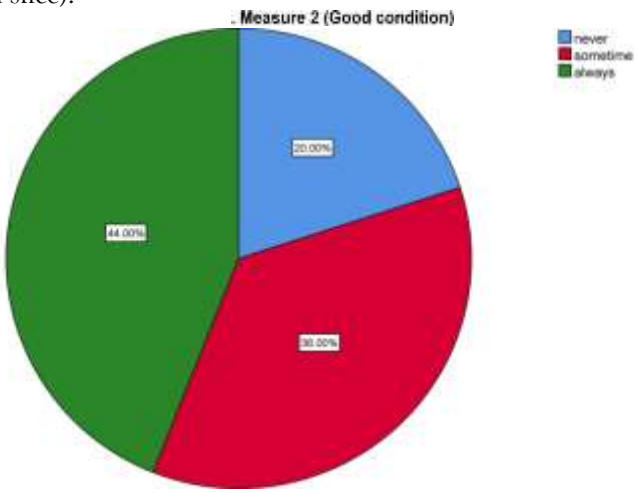
The pie chart shows the distribution of responses for "Measure 0 (Very weak)" across three categories.
- Never: 12.00% of the respondents chose this option, meaning a small slice of people say the measure is never weak.
- Sometimes: 32.00% picked this, indicating about one-third of the participants feel the measure is weak only some of the time.
- Always: The biggest portion, 56.00%, selected this, showing that more than half of the respondents think the measure is always very weak.

In simple terms, the chart tells you most people (56%) believe the measure is constantly weak, while a moderate chunk (32%) see it as weak occasionally, and a tiny group (12%) say it's never weak.

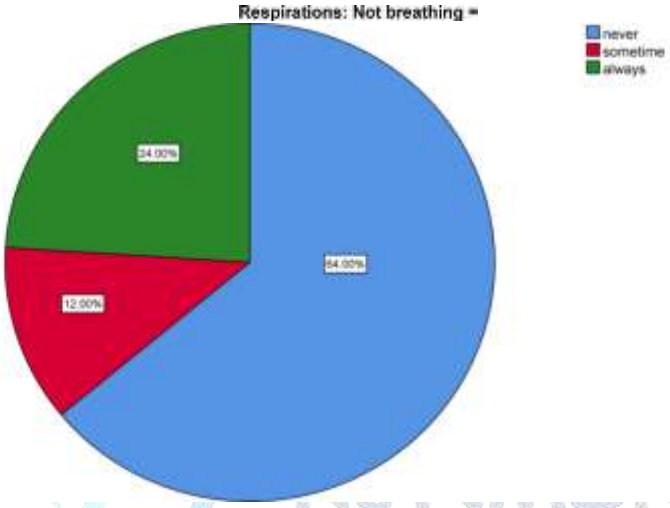


The chart shows a pie graph titled "Measure 1 (Mild to moderate) that splits responses into three categories:
- never – 16.00% (blue slice).
- sometime – 42.00% (red slice).
- always – 42.00% (green slice).

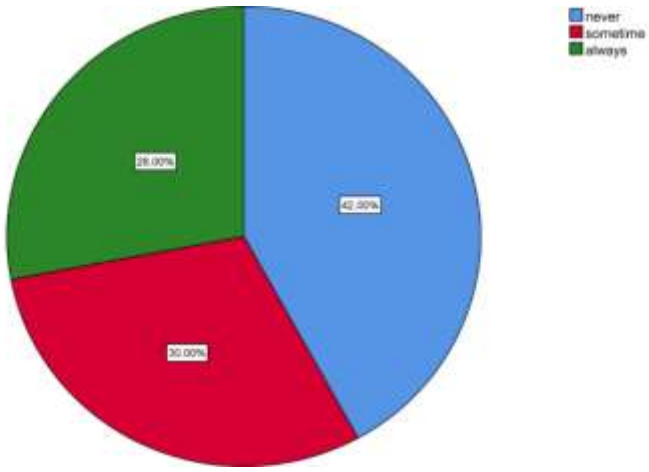
In my own words, the graph tells us that for this mild-to-moderate measure, 16% of the cases never happen, while the other 84% do occur – split evenly between happening sometimes and happening always.



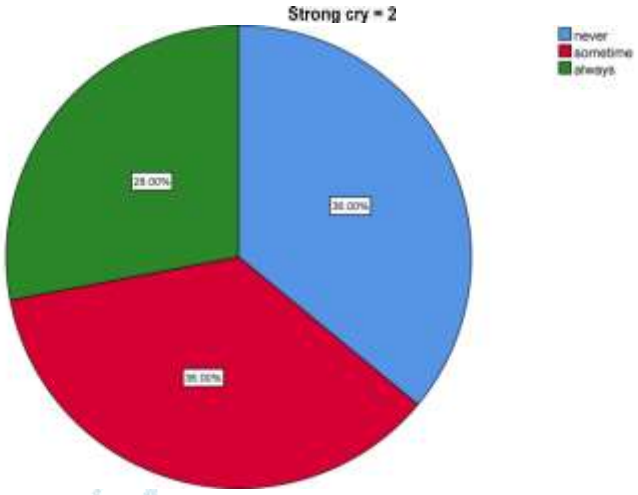
The pie chart shows the distribution of responses for Measure 2 (Good condition). It splits the data into three categories:
- Never: 20.00% of the cases fall in this segment, shown in blue.
- Sometime: 36.00% of the cases are in this part, colored red.
- Always: The largest slice, green, represents 44.00% of the cases, indicating the highest frequency.
In simple words, the chart tells us that under good conditions, 44% of the time things are always as expected, 36% of the time they happen sometimes, and 20% of the time they never occur.



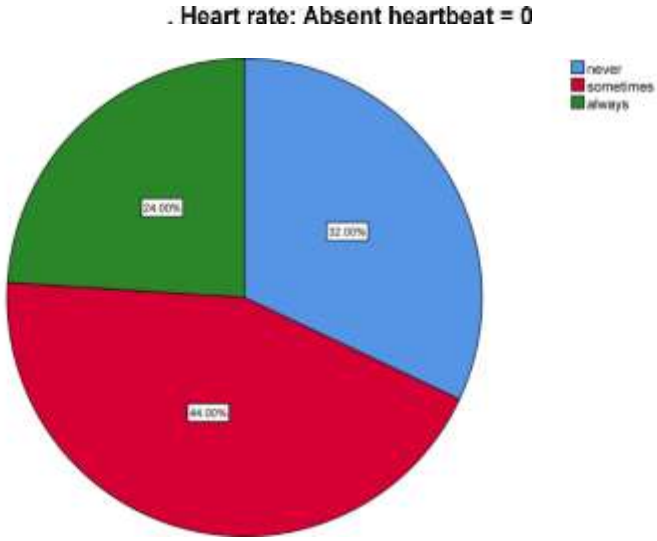
The pie chart shows the distribution of "Respirations: Not breathing" with three categories:
- Never (blue slice): 64.00% of cases never experience weak or irregular breathing.
- Sometime (red slice): 12.00% of cases experience it occasionally.
- Always (green slice): 24.00% of cases always have weak or irregular breathing.
In my own words, the chart tells us that most people (about two-thirds) never have breathing problems, a small group (12%) face them sometimes, and roughly a quarter always deal with weak or irregular breathing.



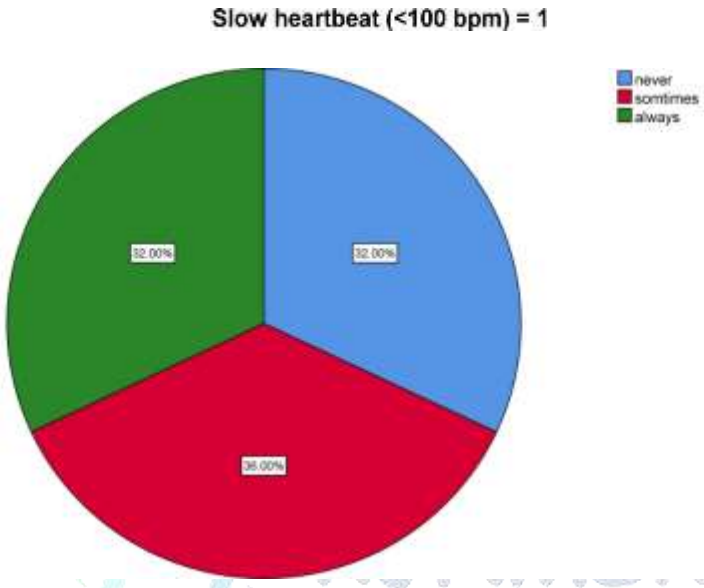
The pie chart shows how often "weak cry, irregular breathing" occurs, split into three categories:
- Never (blue slice): 42.00% of cases report that the symptom never happens.
- Sometime (red slice): 30.00% of cases say the symptom appears occasionally.
- Always (green slice): 28.00% of cases indicate the symptom is always present.
In my own words, the chart tells us that most of the time (42%) people don't experience a weak cry with irregular breathing, while about 30% see it happen sometimes, and roughly 28% experience it every time.



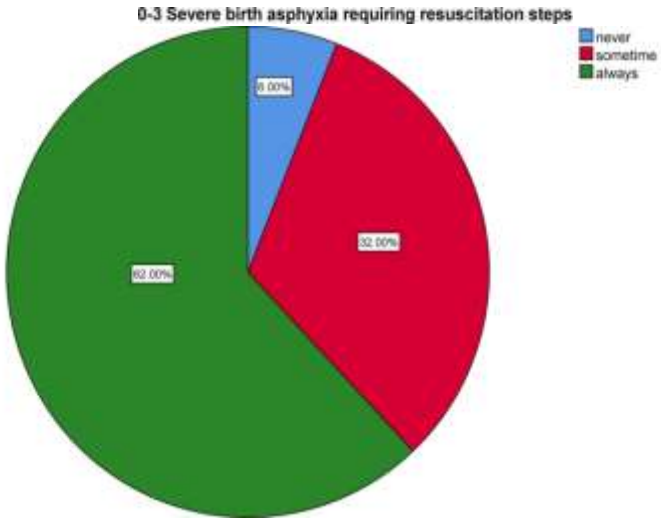
The pie chart shows the distribution of responses to the statement "Strong cry = 2," splitting the data into three categories:
- Never (blue slice): 36.00% of respondents chose this option, meaning they never associate a strong cry with the value 2.
In simple terms, the chart tells us that the majority (36% + 36% = 72%) either never or only occasionally relate an intense cry to the score 2,
- Sometimes (red slice): Another 36.00% picked this, indicating they only sometimes link a strong cry to the value 2.
- Always (green slice): 28.00% selected this, showing they always connect a strong cry with the value 2.
while a smaller portion (28%) always makes that connection.



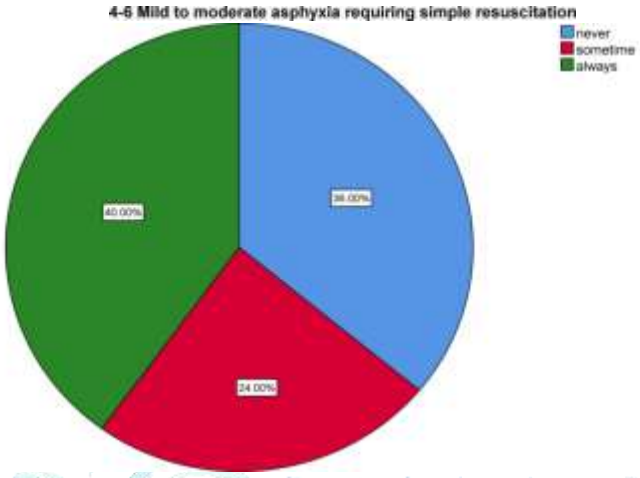
The pie chart shows how often an absent heartbeat (heart rate = 0) is observed. It splits the data into three slices:
- Never (blue): 32.00% of cases report no absent heartbeat.
- Sometimes (red): 44.00% of cases experience an absent heartbeat occasionally.
- Always (green): 24.00% of cases have an absent heartbeat every time.
In simple words, most of the time (44%) the heartbeat disappears only sometimes, while 32% never see it disappear and 24% see it disappear every time.



The chart shows a pie split into three slices that represent how often people experience a slow heartbeat (under 100 bpm).
- The blue slice (32 %) stands for “never” having a slow heartbeat.
- The red slice (36 %) marks “sometimes” experiencing it.
- The green slice (32 %) indicates “always” having a slow heartbeat.
In simple terms, about a third of the group never feels a slow pulse, a little more than a third feels it occasionally, and another third feels it all the time.



The pie chart shows the distribution of severe birth asphyxia cases (graded 0–3) that required resuscitation steps. In simple terms, it breaks down how often resuscitation was needed:
- Always (green slice): 62% of the cases always needed resuscitation steps.
- Sometime (red slice): 32% of the cases sometimes required resuscitation.
- Never (blue slice): 6% of the cases never needed resuscitation steps.
So, the majority (62%) of severe birth asphyxia cases constantly required resuscitation, while a small 6% never needed it.



The pie chart shows the distribution of responses regarding mild to moderate asphyxia that needs simple resuscitation. It splits the data into three categories:
- Never: 36.00% of cases – this means in 36% of situations, simple resuscitation is never required for mild to moderate asphyxia.
- Sometimes: 24.00% of cases – in 24% of situations, simple resuscitation is needed sometimes.
- Always: 40.00% of cases – in 40% of situations, simple resuscitation is always needed for mild to moderate asphyxia.
In simple terms, the chart tells us that in most cases (40%), simple resuscitation is always used for mild to moderate asphyxia, while 36% say it's never used, and 24% say it's used only sometimes
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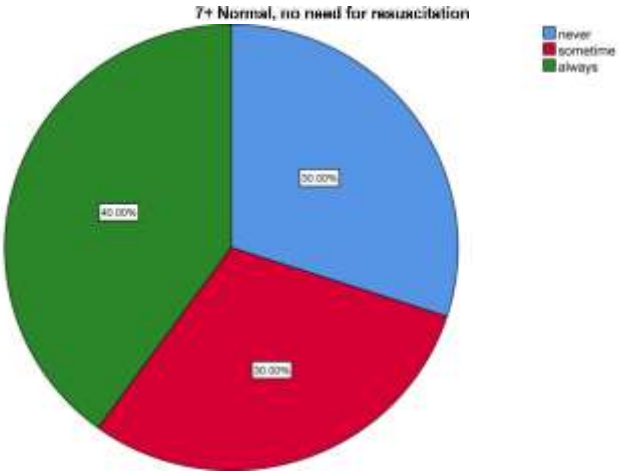

Yo, you nailed the breakdown spot-on! The chart splits the responses into three chunks about a 7+ score (which means a normal condition where no resuscitation is needed):
- 30% say never (blue slice),
- 30% say sometimes (red slice),
- 40% say always (green slice).
You summed it up like this: the chart divides the results into three almost-equal groups—one-third think the normal score is never hit, another third think it's hit only sometimes, and the biggest 40% believe it's always achieved.

Discussion

This study assessed the knowledge and practice regarding the APGAR score among 50 healthcare providers in secondary-level hospitals in Charsadda. The findings reveal a critical dichotomy: while there is a foundational awareness of the APGAR score as a concept, its precise application and interpretation are inconsistent, aligning with global concerns about its variable use in clinical practice (Michel & Lowe, 2017).

Knowledge of APGAR Fundamentals

A majority of participants (88%) reported being familiar with the APGAR score as an objective neonatal assessment tool, with 36% stating they "always" use it. This indicates a high level of nominal awareness, which is a positive baseline. However, deeper probing into the scoring criteria revealed significant gaps. For instance, while 54% "always" knew the score comprises five signs, a substantial 46% did not consistently recall this fundamental structure. This gap between general awareness and precise knowledge underscores a common challenge where the APGAR score is recognized in name but not mastered in detail, a phenomenon noted in studies from similar settings (Akbar, Arshad, & Shaheen, 2021).

Application and Consistency in Scoring

The data on specific APGAR components highlight troubling inconsistencies. Recognition was strongest for severe conditions (e.g., 56% always recognized "Measure 0 - Very weak"), but weaker for distinguishing between mild/moderate and normal states (e.g., only 44% always recognized "Measure 2 - Good condition"). This suggests a clinical bias towards identifying crises but a potential oversight in accurately categorizing neonates who may still require observation or simple intervention. The most pronounced inconsistencies were in scoring vital signs. For example, only 28% of providers "always" correctly identified a "strong cry" as scoring 2 for respiratory effort, and knowledge of heart rate criteria was fragmented (44% "sometimes" knew absent heartbeat scores 0). Such variability directly impacts the reliability of the total score, echoing Livingston's (1990) findings on poor interrater reliability, especially for specific components.

Interpretation of Score Ranges

The interpretation of aggregated scores showed a similar pattern. While 62% of providers correctly "always" identified a score of 0–3 as indicating severe asphyxia requiring resuscitation, the accuracy dropped for the 4–6 range (40% "always" correct) and the 7+ normal range (40% "always" correct). This indicates that nearly half of the providers may misclassify neonates in the middle and upper ranges, potentially leading to either unnecessary interventions for vigorous babies or inadequate support for those with mild to moderate depression. This misclassification risk is critical, as an Apgar score less than 7 is associated with higher rates of neurological abnormalities and mortality (Jeganathan et al., as cited in the introduction).

Demographic and Contextual Factors

The sample comprised mostly midwifery and medical school graduates (36% each) with 1–5 years of experience (50%). While the study did not perform inferential analysis to correlate demographics with knowledge scores, the high workload and resource constraints typical of secondary hospitals in Charsadda, as highlighted in the literature review, likely compound these knowledge gaps. The pressure of a high-volume clinical environment can hinder the systematic application of scoring protocols, leading to

rushed or inaccurate assessments (Polit & Beck, 2021).

Recommendations

Based on the identified gaps between knowledge and practice, the following targeted recommendations are proposed:

1. Implement Standardized, Simulation-Based Training: Move beyond theoretical instruction to mandatory, hands-on training workshops using neonatal manikins. These sessions should drill the scoring of each APGAR component under simulated delivery room conditions. This approach has been shown to improve practical competency and retention (Akbar et al., 2021).
2. Introduce Job Aids and Clinical Decision Support: Develop and disseminate simple visual aids, such as laminated cards or posters displaying the APGAR scoring criteria, to be placed prominently in all delivery and neonatal care units. These tools can serve as quick references to reduce errors during fast-paced assessments.
3. Establish a Peer-Led Quality Assurance Mechanism: Create a system of periodic, confidential audits of APGAR scoring documentation. Senior staff or designated "neonatal champions" can provide constructive feedback to their peers, fostering a culture of continuous improvement and standardized practice.
4. Integrate APGAR Competency into Institutional Protocols: Hospital management should formally incorporate APGAR scoring accuracy and timely assessment into clinical governance metrics and staff performance evaluations. This institutional commitment is crucial for sustaining improvements.
5. Conduct Longitudinal Research: Future studies should employ a pre-post intervention design to quantitatively measure the impact of the recommended training programs on both knowledge scores and, more importantly, on clinical outcomes for neonates.

Limitations of the Study

While this study provides valuable insights, several limitations must be acknowledged:

- Cross-Sectional Design: The study captures a snapshot in time, preventing the establishment of causal relationships between variables or observation of changes in knowledge over time (Polit & Beck, 2021).
- Self-Reported Data: The reliance on a questionnaire risks social desirability bias, where participants may overstate their knowledge or frequency of correct practice. Actual clinical practice may differ from reported behavior.
- Small Sample Size and Single Setting: With a sample of 50 from one district, the findings may not be fully generalizable to all secondary hospitals in Pakistan or other regions.
- Lack of Observational Validation: The study measured reported practice, not directly observed clinical performance. A significant gap often exists between what providers know/report and what they do in a real, high-pressure delivery (Livingston, 1990).

Conclusion

The APGAR score remains an indispensable, rapid tool for neonatal assessment. However, its utility is wholly dependent on the competency of the healthcare provider applying it. This study concludes that among healthcare providers in Charsadda's secondary hospitals, there is a significant knowledge-practice gap in the use of the APGAR score. Providers have the foundational awareness but lack the detailed, applied expertise required for consistent and accurate scoring. This gap represents a critical point for intervention. Addressing it through structured, practical training and systemic support is not merely an academic exercise but an essential step toward improving the accuracy of newborn assessments, ensuring timely and appropriate interventions, and ultimately enhancing neonatal outcomes in alignment with global standards of care (Apgar, 1953; Michel & Lowe, 2017).

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