

REFERRAL APPROPRIATENESS AND STRUCTURAL BARRIERS IN BASIC EMERGENCY OBSTETRIC AND NEWBORN CARE IMPLEMENTATION: EVIDENCE FROM ZAMBOANGA CITY MEDICAL CENTER, ZAMBOANGA PENINSULA, PHILIPPINES

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Abstract

Background. The Basic Emergency Obstetric and Newborn Care (BEMONC) program equips lower-level facilities to manage uncomplicated deliveries and stabilize obstetric emergencies, reducing unnecessary transfers to tertiary hospitals. Despite sustained training coverage in the Philippines, tertiary facilities continue to absorb high obstetric referral volumes. This study determined the prevalence, clinical profile, institutional sources, and structural determinants of non-indicated and potentially avoidable obstetric referrals received by a tertiary government hospital in Southwestern Mindanao from February 2024 to April 2025.

Methods. A retrospective cross-sectional chart review examined 300 consecutive obstetric referral records from the Department of Obstetrics and Gynecology Referral Census. Non-indicated referrals were defined as uncomplicated normal spontaneous vaginal deliveries without a documented tertiary-level indication. A broader potentially avoidable category captured uncomplicated vaginal deliveries transferred for weak, non-medical, or capacity-related reasons. Referring facilities were cross-referenced against the institutional BEMONC training registry. Descriptive statistics, exploratory odds ratios, and sensitivity analyses were performed.

Results. Of 300 referrals, 27 (9.0%) were strictly non-indicated and 35 (11.7%) were potentially avoidable. Cesarean section accounted for 40.7% of outcomes. Generic escalation (42.7%), absence of an obstetrician (18.0%), lack of incubator/neonatal support (17.0%), and absence of an anesthesiologist (15.7%) accounted for 93.4% of referral reasons. Primary care facilities had higher odds of avoidable referral than hospital-level facilities (OR 7.26, 95% CI 2.91–18.10). Training volume showed no significant correlation with referral appropriateness (Spearman's rho = 0.02, p = .94), and facility training status was not significantly associated with avoidable referral after adjusting for facility level (OR 2.47, 95% CI 0.51–11.89).

Conclusion and Implications. Strictly non-indicated referrals were uncommon. Avoidable transfers reflected structural resource limitations rather than poor clinical judgment. These findings suggest BEMONC training alone is unlikely to reduce avoidable obstetric referrals unless matched by personnel, equipment, and referral governance. Program evaluation should incorporate facility-level referral performance alongside training coverage.

Keywords: BEMONC, maternal health, obstetric referral, referral appropriateness, structural barriers

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Research Highlights

What is the current knowledge?

- BEMONC training is the primary national strategy for enabling lower-level facilities in the Philippines to manage uncomplicated deliveries and stabilize obstetric emergencies.
- Program evaluation has relied largely on input measures such as the number of providers trained, post-test scores, and participant satisfaction.
- Tertiary hospitals continue to absorb high obstetric referral volumes despite sustained training coverage.
- Evidence linking facility-level training coverage to actual referral behavior in the Philippine setting is limited, particularly for geographically isolated and disadvantaged areas.

What is new in this study?

- Referral appropriateness is applied as a functional, output-side measure of BEMONC performance rather than a training-input measure.
- Strictly non-indicated referrals were uncommon. Most avoidable transfers traced to missing specialists, absent equipment, and undocumented clinical rationale rather than to clinical misjudgment.
- Primary care and rural health unit facilities had roughly sevenfold higher odds of potentially avoidable referral than hospital-level facilities.
- Among facilities with confirmed training records, training volume showed no significant correlation with referral appropriateness ($\rho = 0.02$, $p = .94$), and training status was not significantly associated with potentially avoidable referral once facility level was accounted for.
- Category-level concordance between referral and final diagnosis is reported, an analysis rarely applied to obstetric transfer.

INTRODUCTION

Maternal mortality remains a major public health problem in the Philippines, and the burden falls hardest on geographically isolated and disadvantaged areas (GIDA), where limited access to obstetric care compounds weak service delivery and fragmented referral systems (Ganancial et al., 2026). The Basic Emergency Obstetric and Newborn Care (BEMONC) program, established by the Department of Health, was designed to build capacity at lower-level facilities so they can manage uncomplicated deliveries and initial obstetric emergencies while transferring genuinely complicated cases without delay (Sy-Cagayan, 2022). If the program works as intended, effective training should reduce unnecessary transfers to tertiary hospitals and reserve specialist capacity for patients who need it (Delele et al., 2021).

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That logic holds only when training is matched by capability. A facility staffed by BEMONC-trained providers still cannot deliver the care they were trained to give if it has no obstetrician, no anesthesiologist, no blood products, no incubator, or none of the operational systems that make emergency obstetric care possible. This distinction is built into the emergency obstetric and newborn care framework itself, which was designed around confirmed performance of clinical signal functions precisely because earlier approaches checked supplies, equipment, staffing, and training and then inferred performance from their presence (EmONC Framework, n.d.). Conventional training evaluations capture completion rates, post-test scores, and participant satisfaction. These are useful, but they say little about whether trained facilities actually retain the patients they are equipped to manage (Tammang, 2018).

Zamboanga City Medical Center (ZCMC), a Department of Health retained tertiary hospital, is the sole research and training government referral hub for the Zamboanga Peninsula and its neighboring islands. Its catchment covers Zamboanga del Norte, Zamboanga del Sur, Basilan, Sulu, and Tawi-Tawi, including island municipalities where transfer carries real logistical cost and clinical risk. Since 2010 the Department of Health, working with ZCMC, has run repeated BEMONC training batches across every facility in Region 9 and the adjacent island provinces. Obstetric referral volume has nonetheless remained high. Whether this reflects a genuine rise in complicated cases or a gap between training and facility-level function has not been examined.

This study uses referral appropriateness as an operational measure of BEMONC functional effectiveness (JSI Research & Training Institute, 2015). Appropriateness has been applied in comparable low-resource settings, where it consistently exposes weaknesses that training-coverage metrics conceal. A facility-based study in eastern Ethiopia found only one in ten maternal referrals appropriate, and identified use of a standard referral form and the presence of referral feedback as the strongest correlates of appropriate transfer (Sharew et al., 2025). A multi-city Indian study similarly found that nearly one in five referrals arose entirely from unavailable human resources or infrastructure rather than from clinical need (Das et al., 2023). Comparable Philippine evidence is scarce, particularly for Mindanao. The objectives of this study were to determine the prevalence of non-indicated and potentially avoidable obstetric referrals, characterize the clinical profile and documented reasons behind them, identify referring facilities that contribute disproportionately to avoidable transfers, and assess whether confirmed BEMONC training was associated with appropriate referral decisions.

LITERATURE REVIEW

BEMONC Implementation Gaps in Low-Resource Settings

BEMONC's introduction in the Philippines was intended to shift uncomplicated obstetric and newborn care to lower-level facilities while preserving tertiary capacity for genuinely complicated cases (Sy-Cagayan, 2022). The emergency obstetric care framework operationalizes this intent through signal functions, a defined set of clinical capabilities a facility must demonstrably perform rather than merely be equipped or staffed for (EmONC Framework, n.d.). Facility-readiness studies in comparable low-resource settings consistently find that this distinction matters in practice. Newborn-care readiness assessments in Ethiopia documented persistent equipment and staffing barriers despite training investment (Delele et al., 2021), an implementation-strength survey across four Ethiopian regions found training coverage alone a poor proxy for functional readiness (JSI Research & Training Institute, 2015), and barrier analyses in rural Pakistan and Luzon likewise found trained providers continuing to refer cases they were theoretically equipped to manage because their facilities lacked the prerequisites to act (Cagayan et al., 2022b; Haider et al., 2019). A facility-level functionality assessment in Luzon localized this gap specifically to personnel capacity rather than institutional or service infrastructure (Cagayan et al., 2022a), and an earlier Philippine BEMONC pilot found that conventional training evaluations, completion rates, post-test scores, and participant satisfaction, say little about whether trained facilities actually retain the patients they are equipped to manage (Tammang, 2018). Implementation guidance and supportive-supervision literature frame minimum equipment standards, explicit referral criteria, geographic access mapping, and regular supervisory contact as necessary complements to training coverage rather than substitutes for it (Brun et al., 2020; Department of Health Regional Office 8 [Philippines], 2014; Ebener et al., 2019).

Referral System Congestion & Governance

Maternal health outcomes in the Philippines remain geographically uneven, with mortality and access burdens falling hardest on geographically isolated and disadvantaged areas (Ganancial et al., 2026). Referral appropriateness has been used as an operational lens on this problem in comparable settings. A facility-based study in eastern Ethiopia found only one in ten maternal referrals appropriate and identified use of a standard referral form and the presence of referral feedback as the strongest correlates of appropriate transfer (Sharew et al., 2025). A multi-city Indian study similarly found that nearly one in five obstetric referrals arose entirely from unavailable human resources or infrastructure rather than clinical need (Das et al., 2023). Documentation quality compounds the governance problem: an audit of maternity referral documentation in northern Ghana found that frontline providers needed job aides and routine audit of form completion more than additional clinical instruction (Ameyaw et al., 2022). A systematic review of interventions to improve obstetric emergency referral decision-making, communication, and feedback across sub-Saharan Africa identified case review sessions, clearer referral criteria, and direct supervisory engagement as the interventions with the strongest supporting evidence (Avoka et al., 2022). Where specialist availability is too sparse to sustain real-time hub-and-spoke referral arrangements, asynchronous provider-to-provider teleconsultation has been reported as a governance-level response: a service linking non-physician clinicians in remote Turkana County, Kenya, with a volunteer network of physicians reported avoided referrals, reduced patient displacement, and reduced cost among its health-system benefits (Fry et al., 2020). Comparable Philippine evidence on referral system congestion and governance remains scarce, particularly for Mindanao, the gap this study addresses.

METHODOLOGY

Study Design and Setting

This was a retrospective cross-sectional chart review. Data were extracted from the monthly Referral Census of the Department of Obstetrics and Gynecology at Zamboanga City Medical Center, a Department of Health retained tertiary government hospital in Southwestern Mindanao, covering February 2024 to April 2025. Reporting follows the STROBE statement for observational studies.

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Study Population and Sampling

The study population comprised all obstetric patients formally referred to ZCMC from external facilities during the study period. Total enumeration was used, and all 300 consecutively documented referral records were included. These 300 records represented the complete obstetric referral census logged by the Department of Obstetrics and Gynecology for the full 15-month study period (February 2024 to April 2025), with no facility-level or temporal subsampling applied. Walk-in patients without referral letters and self-referrals were excluded.

Data Source and Extraction

Each monthly Referral Census document recorded the date of admission, the referring facility, the stated reason for referral, the admitting diagnosis, and the final diagnosis or operation performed. Age and obstetric history were extracted where documented. Hospital numbers were used only to verify records during extraction and were removed from the analytic dataset. Patient names were excluded in compliance with Republic Act No. 10173, the Data Privacy Act of 2012.

Operational Definitions

Definitions followed the approach used in prior appropriateness studies, in which transfer is judged against what the referring facility level should have been able to manage and against the patient's documented clinical outcome (Das et al., 2023; Sharew et al., 2025). A referral was classified as non-indicated when three conditions were met: the patient was referred from an external facility, the final hospital outcome was an uncomplicated normal spontaneous vaginal delivery (NSVD), and no tertiary-level obstetric indication was documented in the referral or admitting diagnosis. A referral was classified as potentially avoidable when the final outcome was an uncomplicated NSVD and the documented reason for transfer was weak, non-medical, or capacity-related, including absence of an obstetrician, absence of an anesthesiologist, no incubator, financial constraint, or generic unspecified transfer. The two categories were mutually exclusive: each referral was assessed against the strict non-indicated criteria first, and only referrals not meeting that definition were then evaluated against the broader potentially avoidable criteria. Referrals meeting neither definition were classified as appropriate or as requiring tertiary-level care.

For training coverage, each unique referring facility was cross-referenced against the institutional BEMONC Training Registry for 2010 to 2025 using keyword-based facility-name matching. Matched training records were classified by professional designation as physician or medical officer, registered nurse, or registered midwife.

Data Analysis

Descriptive statistics were computed for all primary variables. Facility-level analysis used two complementary metrics. Avoidable referral rate was the proportion of a facility's referrals classified as potentially avoidable. Absolute burden was the total number of avoidable cases attributed to a facility. Exploratory crude odds ratios with 95% confidence intervals were calculated from 2×2 tables to examine associations between potentially avoidable referral and facility type, gravidity, and age group. The association between BEMONC training status and potentially avoidable referral was assessed at the facility level using a facility-weighted binomial logistic regression (avoidable referrals per total referrals as the outcome), Fisher's exact test for the presence of any avoidable referral, and the Mann-Whitney U test comparing facility-level avoidable-referral rates, given the small number of untrained facilities and unequal referral volumes across facilities; the regression was additionally adjusted for facility level given its independent association with potentially avoidable referral. Given the small number of potentially avoidable referrals and untrained facilities, these exploratory models were checked for coefficient stability; the resulting wide confidence intervals are interpreted as reflecting limited precision rather than a stable null estimate. The relationship between the number of personnel trained per facility and the facility-level avoidable-referral rate was assessed using Spearman's rank correlation. Sensitivity analysis assessed the effect of incomplete documentation on the prevalence estimate for non-indicated referrals under strict, moderate, and worst-case reclassification assumptions. Diagnostic concordance between referral and final tertiary-level diagnosis was assessed at the level of the individual diagnosis rather than the patient, since a single patient could carry more than one referral diagnosis; the analysis therefore comprised 372 diagnostic entries drawn from the 300 referred patients. Analyses were performed in Microsoft Excel and JASP.

Use of Artificial Intelligence

Grammarly (Grammarly Inc.) was used for language and grammar-editing assistance during manuscript preparation. Perplexity AI (Perplexity AI, Inc.) was used to assist in literature searching and reference identification. Both tools were used solely for language refinement and source-finding. All interpretations, analyses, and conclusions are the authors' own, and all AI-assisted outputs were reviewed and verified by the authors.

Ethical Considerations

Ethical approval was obtained from the Zamboanga City Medical Center Ethics Review Board (ERB Protocol No. ZCMC-ERB-2025-15) on June 19, 2025, prior to data extraction. The study involved retrospective chart review with no direct patient contact. Individual informed consent was waived because of the minimal-risk design. All results are reported in aggregate, and the study was conducted in accordance with the Declaration of Helsinki.

RESULTS

Cohort Characteristics

Three hundred obstetric referral records were analyzed (Table 1). Monthly referral volume ranged from 8 in December 2024 to 31 in April 2024, with a median of 22. Most referred patients were aged 20 to 34 years (171, 57.0%), followed by those 35 years and above (71, 23.7%) and those younger than 20 years (52, 17.3%). Multigravidas accounted for 58.0% of cases and primigravidas for 41.7%. Hospital-level facilities generated most referrals (268, 89.3%), while primary care and rural health unit (RHU) facilities accounted for 24 (8.0%).

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Table 1.

Sociodemographic and Institutional Characteristics of Referred Obstetric Patients (N = 300)

Variable	<i>n</i>	%
Age group		
Less than 20 years	52	17.3
20 to 34 years	171	57.0
35 years and above	71	23.7
Not recorded	6	2.0
Obstetric history (gravidity)		
Primigravida	125	41.7
Multigravida	174	58.0
Not recorded	1	0.3
Referring facility type		
Hospital-level (secondary or district)	268	89.3
Primary care, RHU, or health center	24	8.0
Clinic or private facility	6	2.0
Other or unspecified	2	0.7
Total referrals	300	100.0

Source: Obstetrics and Gynecology Referral Census, Zamboanga City Medical Center, February 2024 to April 2025.

Prevalence of Non-Indicated and Potentially Avoidable Referrals

Under the strict definition, 27 referrals (9.0%) were non-indicated (Table 2). Under the broader definition, 35 (11.7%) were potentially avoidable. The remaining 238 referrals (79.3%) were classified as appropriate or as requiring tertiary-level care. Cesarean section was the most common delivery outcome (122, 40.7%) (Table 3). Of the 93 patients who delivered vaginally, 38 (12.7% of all referrals) were uncomplicated and 55 (18.3%) had documented major complications.

Table 2.

Prevalence of Non-Indicated and Potentially Avoidable Referrals (N = 300)

Category	<i>n</i>	%
Non-indicated referral (strict definition)	27	9.0
Potentially avoidable referral (broad definition)	35	11.7

Strict definition: uncomplicated vaginal delivery with no documented tertiary-level indication at admission.

Broad definition: uncomplicated vaginal delivery with a weak, non-medical, or capacity-related referral reason.

Table 3.

Final Delivery and Outcome Profile of Referred Obstetric Patients (N = 300)

Final delivery or outcome category	<i>n</i>	%
NSVD without major complications	38	12.7
NSVD with documented major complication	55	18.3
Instrumental delivery	12	4.0
Cesarean section	122	40.7
Surgical (non-delivery), not delivered, or undetermined	73	24.3
Total	300	100.0

The final category includes antepartum admissions without delivery during the documented period and records with incomplete outcome notation.

Documented Reasons for Referral

Generic escalation or transfer without a specific clinical indication was the most frequent documented reason (128, 42.7%), followed by absence of an obstetrician (54, 18.0%), lack of an incubator or neonatal support (51, 17.0%), and absence of an anesthesiologist (47, 15.7%). These four categories accounted for 93.4% of documented reasons (Table 4).

Table 4.

Documented Obstetric Referral Reasons, Zamboanga City Medical Center (N = 300)

Documented reason	<i>n</i>	% of total referrals
Generic escalation or transfer	128	42.7
No obstetric provider	54	18.0
No incubator or neonatal support	51	17.0
No anesthesiologist	47	15.7
No blood products	24	8.0
Financial constraints	12	4.0
Intensive care or neonatal intensive care need	9	3.0
Isolation or infection-control limits	1	0.3

Note: Referrals could carry more than one documented reason; counts therefore sum to 326 against 300 total referrals. Percentages are calculated against total referrals (N = 300) and do not sum to 100%.

Facility-Level Analysis and Exploratory Predictor Screening

Hospital facilities accounted for most raw referrals (268) but had comparatively low proportions of non-indicated and potentially avoidable transfers (6.3% and 9.0%) (Table 5). Primary care and RHU facilities had markedly higher rates, at 37.5% and 41.7%. Among facilities with at least five referrals, Talon-Talon Health Center, Siocon District Hospital, and Alicia District Hospital showed elevated potentially avoidable rates. Dr. George T. Hofer Medical Center and Mindanao Central Sanitarium contributed the largest absolute numbers of potentially avoidable cases, driven by overall referral volume rather than by high rates (Table 6).

Exploratory analysis showed sevenfold higher odds of potentially avoidable referral from primary care and RHU-level facilities compared with hospital-level facilities (OR 7.26, 95% CI 2.91 to 18.10, $p < .001$). Gravidity and age 35 years and above were not significantly associated with potentially avoidable referral. Age below 20 years showed an elevated but not statistically significant odds ratio that approached conventional significance (OR 2.27, 95% CI 0.98 to 5.22, $p = .055$) (Table 7).

Table 5.

Non-Indicated and Potentially Avoidable Referrals by Facility Level (N = 300)

Facility level	Total referrals (n)	Non-indicated (n)	Non-indicated rate (%)	Potentially avoidable (n)	Potentially avoidable rate (%)
Hospital	268	17	6.3	24	9.0
Primary care, health center, or RHU	24	9	37.5	10	41.7
Clinic or private	6	1	16.7	1	16.7
Other or unspecified	2	0	0.0	0	0.0
Total	300	27	9.0	35	11.7

Table 6.

Non-Indicated and Potentially Avoidable Referrals by Referring Facility

Referring facility	Facility type	Total (n)	Non-ind. (n)	Non-ind. rate (%)	Avoidable (n)	Avoidable rate (%)
Dr. George T. Hofer Medical Center	Hospital	101	6	5.9	7	6.9
Mindanao Central Sanitarium	Hospital	53	4	7.5	7	13.2
Labuan General Hospital	Hospital	36	2	5.6	3	8.3
Siocon District Hospital	Hospital	24	3	12.5	5	20.8
Alicia District Hospital	Hospital	12	2	16.7	2	16.7
Basilan General Hospital	Hospital	12	0	0.0	0	0.0
Talon-Talon Health Center	Primary care, RHU	6	3	50.0	3	50.0

Note: Facilities contributing at least five referrals during the study period. The seven facilities listed account for 244 of the 300 referrals, 20 of the 27 non-indicated cases, and 27 of the 35 potentially avoidable cases. The remaining facilities, each contributing fewer than five referrals, collectively accounted for the remaining 56 referrals, 7 non-indicated cases, and 8 potentially avoidable cases.

Table 7.

Exploratory Crude Odds Ratios for Potentially Avoidable Referral (N = 300)

Predictor	Comparison	Odds ratio	95% CI	p-value
Facility type	Primary care/RHU vs. hospital	7.26	2.91 to 18.10	<.001
Gravidity	Primigravida vs. multigravida	1.36	0.67 to 2.77	.40
Age group	<20 years vs. 20–34 years	2.27	0.98 to 5.22	.055
Age group	≥35 years vs. 20–34 years	1.23	0.50 to 3.02	.65

Note: Crude odds ratios from 2×2 tables (20–34 years and multigravida as reference categories). Only facility type was significant (CI excludes 1); the <20-years comparison approached but did not reach significance.

Diagnostic Concordance

Agreement between referral diagnosis and final tertiary-level diagnosis was assessed across 372 diagnostic entries. Overall concordance was 68.8% (Table 8). Labor dystocia showed complete agreement. Malpresentation, placental or hemorrhagic conditions, and hypertensive disorders exceeded 83%. Premature rupture of membranes (PROM) and preterm labor showed the lowest concordance at 32.7%, meaning fewer than one in three referral diagnoses in this category matched the final diagnosis.

Table 8.

Category-Level Diagnostic Concordance by Referral Diagnosis Group

Referral diagnosis category	Concordant	Discordant	Total	Concordance (%)
Fetal compromise	6	2	8	75.0
Hypertensive disorder	80	16	96	83.3
Labor dystocia	8	0	8	100.0
Malpresentation	22	4	26	84.6
PROM or preterm labor	32	66	98	32.7
Placental or hemorrhagic	23	3	26	88.5
Severe medical condition	11	6	17	64.7
Other or unspecified	74	19	93	79.6
Overall	256	116	372	68.8

Sensitivity Analysis

Sensitivity analysis tested whether incomplete documentation could alter the primary conclusion. Of the 300 referrals, 63 (21.0%) had an undetermined or non-delivery outcome, precluding confirmation of the uncomplicated-NSVD criterion required for non-indicated classification; these were excluded from the primary (strict) estimate of 27/300 (9.0%). Under a moderate scenario, the 31 of these 63

referrals that also lacked a documented tertiary-level indication were reclassified as non-indicated, raising the estimate to 58/300 (19.3%). Under a worst-case scenario, all 63 referrals with an undetermined outcome were reclassified as non-indicated, raising the estimate to 90/300 (30.0%) (Table 9). Strictly non-indicated referrals remained a minority of transfers under the strict and moderate scenarios; under the worst-case scenario the estimate approached one in three referrals, indicating that outcome ambiguity, rather than indication documentation alone, is the primary driver of uncertainty in this estimate.

Table 9.

Prevalence of Non-Indicated Referrals Under Three Documentation-Sensitivity Scenarios (N = 300)

Scenario	Reclassification rule applied to ambiguous records	Non-indicated (n)	Prevalence (%)
Strict (primary)	None. Only referrals meeting all three non-indicated criteria were counted; the 63 ambiguous records were excluded.	27	9.0
Moderate	The 31 of 63 ambiguous records that also had no documented tertiary-level indication were reclassified as non-indicated.	58	19.3
Worst-case	All 63 ambiguous records were reclassified as non-indicated.	90	30.0

Note: Ambiguous records are the 63 referrals (21.0%) with an undetermined or non-delivery outcome, for which the uncomplicated NSVD criterion could not be confirmed. Percentages use all 300 referrals as the denominator.

BEMONC Training Coverage in the Zamboanga Peninsula

Between 2010 and 2025 the Department of Health and ZCMC conducted 39 BEMONC training batches across Region 9, training 1,399 health workers from 384 facilities. This comprised 790 midwives, 290 nurses, and 319 physicians. Among the 40 referring facilities in this study, 39 were cross-referenced against the institutional BEMONC Training Registry; the remaining facility, a private obstetric clinic, fell outside the registry's scope. Of the 39 checked, 27 (69.2%) had at least one confirmed training entry and 12 (30.8%) did not. In an exploratory facility-level analysis restricted to the 36 referring facilities with matched training and referral records (24 trained, 12 untrained), potentially avoidable referral occurred at both trained and untrained facilities. The facility-weighted logistic regression found no significant association between training status and potentially avoidable referral (OR 1.60, 95% CI 0.36–7.08, $p = .54$; adjusted for facility level, OR 2.47, 95% CI 0.51–11.89, $p = .26$), and the facility-level avoidable-referral rate did not differ significantly between trained and untrained facilities (Mann-

Whitney U, $p = .096$; Fisher's exact test on presence of any avoidable referral, $p = .076$). Among trained facilities, the number of personnel trained showed no correlation with the facility-level avoidable-referral rate (Spearman's $\rho = 0.02$, $p = .94$) (Table 10). High training coverage did not translate into a statistically detectable improvement in facility-level function, although the small number of untrained facilities limits the precision of these estimates.

Table 10.

Exploratory Association Between BEMONC Training Status, Personnel Trained, and Potentially Avoidable Referral at the Facility Level ($n = 36$ Referring Facilities)

Analysis	Statistic	Result	95% CI / p -value
Potentially avoidable referral, any occurrence (trained vs. untrained)	Fisher's exact test	OR 5.00 (crude)	$p = .076$
Facility-level avoidable-referral rate (trained vs. untrained)	Mann-Whitney U	Median 3.45% vs. 0.00%	$p = .096$
Potentially avoidable referral ~ training status (crude)	Facility-weighted binomial logistic regression	OR 1.60	95% CI 0.36–7.08, $p = .54$
Potentially avoidable referral ~ training status (adjusted for facility level)	Facility-weighted binomial logistic regression	OR 2.47	95% CI 0.51–11.89, $p = .26$
Number of personnel trained vs. facility avoidable-referral rate (trained facilities only, $n = 24$)	Spearman's rank correlation	$\rho = 0.02$	$p = .94$
Potentially avoidable referral ~ number of personnel trained (continuous, all facilities)	Facility-weighted binomial logistic regression	OR 1.003 per person trained	95% CI 0.979–1.029, $p = .79$

Note: The training-registry workbook combines Sibuco HC and Sibuco Municipal Hospital into a single trained row; counting them separately, as in the training-coverage figures reported above, yields 39 registry-checked facilities (27 trained, 12 untrained). Because referral records for the two Sibuco facilities are not separately attributable in the referral census, they are retained as one combined unit for the facility-level statistical tests below, giving an analysis sample of 36 facilities (24 trained, 12 untrained) with matched referral counts. All analyses are exploratory; the small number of untrained facilities ($n = 12$) yields wide confidence intervals, and null findings should be interpreted as inconclusive rather than as confirmed absence of association.

DISCUSSION

Only 9.0% of referrals met the strict non-indicated definition. Most patients transferred to ZCMC during the study period had clinical needs that genuinely warranted tertiary care. This is not a system in which referring providers routinely send patients they could manage themselves.

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When avoidable transfers did occur, the pattern points to infrastructure rather than clinical judgment. Generic escalation without a stated clinical reason accounted for 42.7% of documented referral reasons, meaning a large share of transfers arrived with no clinical rationale recorded at the point of referral. An audit of maternity referral documentation in northern Ghana found the same pattern and concluded that frontline providers require training, job aides, and routine audit of form completion rather than additional clinical instruction (Ameyaw et al., 2022). Whatever the cause, incomplete documentation degrades the receiving facility's ability to prepare.

The remaining reasons are structural. A facility without a surgeon cannot perform a cesarean section and therefore cannot retain the patient. Without an incubator it cannot manage a preterm infant. These are gaps in service readiness, not gaps in clinical knowledge, and they would persist even if every provider in the facility passed a BEMONC competency examination. The pattern matches findings from rural Ethiopia, Pakistan, and Luzon, where trained providers continued to refer cases they were theoretically equipped to manage because their facilities lacked the prerequisites for that management (Cagayan et al., 2022b; Delele et al., 2021; Haider et al., 2019). It also matches the Indian multi-city finding that a substantial minority of obstetric referrals arose entirely from missing personnel or infrastructure (Das et al., 2023). This structural pattern echoes the long-recognized distinction between delays in deciding to seek or reaching care and a distinct third delay: inadequate treatment once a woman reaches a facility (Thaddeus & Maine, 1994). Women referred under comparable circumstances elsewhere describe similar staffing and supply shortfalls at the referring facility (Keem et al., 2025).

The implication for program design is uncomfortable. Counting trained providers may overstate BEMONC's functional impact. Training is an input and changed referral behavior is an output, and these findings suggest the two can diverge when facility conditions go unaddressed. Systematic reviews of emergency obstetric care training consistently find measurable gains in provider knowledge and skills but far weaker and less consistent evidence that this translates into changed clinical practice or improved facility-level outcomes (Ameh et al., 2019; van Lonkhuijzen et al., 2010). This is consistent with the facility-level exploratory analysis in this study: training status showed no significant association with potentially avoidable referral once facility level was accounted for (adjusted OR 2.47, 95% CI 0.51–11.89), and the number of personnel trained per facility showed no correlation with the facility-level avoidable-referral rate (Spearman's $\rho = 0.02$, $p = .94$) (Table 10). Given the small number of untrained facilities and the correspondingly wide confidence intervals around these estimates, this absence of a statistically significant association may partly reflect limited statistical power rather than a true absence of effect. Facility-level assessment in Luzon reached a parallel conclusion, with personnel capacity rather than institutional or service capacity pulling down overall functionality scores (Cagayan et al., 2022a). The emergency obstetric care framework anticipated this problem by insisting that facilities demonstrate performance of signal functions rather than merely possess the inputs for them (EmONC Framework, n.d.; World Health Organization et al., 2009). An intervention that trains providers without asking whether they have the equipment, staffing, and systems to act on that training risks measuring the wrong thing.

Facility-level data sharpen the picture. Proportional avoidable rates and absolute avoidable counts do not identify the same priority facilities. Siocon District Hospital had a potentially avoidable rate of 20.8%, which points to something specific about how referral decisions are made there. Dr. George T. Hofer Medical Center contributed seven avoidable cases not because its rate was high but because it

referred more patients overall. These are different problems requiring different responses. Rate-driven facilities may benefit from case review sessions, clearer referral criteria, and direct supervisory engagement, all of which appear among the referral decision-making interventions with the strongest supporting evidence (Avoka et al., 2022). Volume-driven facilities may instead need structural support: faster specialist access, better internal triage, and more reliable documentation.

The primary care finding is the most actionable. Sevenfold higher odds of potentially avoidable referral relative to hospital-level facilities is a large effect. This mirrors the broader bypassing literature, in which women and referring providers alike route around lower-level facilities perceived to lack functional capacity, even at the cost of longer travel or duplicated care-seeking (Karkee et al., 2015; Sabde et al., 2018; Salazar et al., 2016). These facilities are by design the least resourced, the furthest from supervisory support, and the most likely to serve populations in geographically isolated areas where any transfer carries logistical and safety cost. Provider-to-provider teleconsultation offers a plausible response. An asynchronous teleconsultation service linking non-physician clinicians in remote Turkana County, Kenya, with a volunteer network of physicians reported avoided referrals among its health system benefits, alongside reduced patient displacement and cost (Fry et al., 2020). Asynchronous models are particularly suited to settings where specialist availability is too sparse to sustain real-time hub-and-spoke arrangements, which describes the island municipalities in this catchment. Minimum equipment standards, explicit referral criteria, geographic access mapping, and regular supervisory contact are the complementary conditions under which BEMONC is most likely to function as intended (Brun et al., 2020; Department of Health Regional Office 8 [Philippines], 2014; Ebener et al., 2019).

The 32.7% concordance for PROM and preterm labor deserves direct attention, and part of it is clinically expected rather than administrative. Preterm labor is difficult to diagnose at the bedside, and roughly two thirds of women diagnosed as being in preterm labor do not deliver within 48 hours (Steer & Flint, 1999). PROM diagnosis is likewise imperfect: conventional speculum-based testing carries meaningful false-positive rates, and clinical suspicion at a referring facility can legitimately differ from what is confirmed on arrival (Garg & Jaiswal, 2023; Thumm et al., 2020). A discordance rate of this magnitude is nonetheless difficult to attribute entirely to diagnostic complexity, and inconsistent documentation, provisional diagnoses recorded as definitive, and differing operational definitions at the two ends of the referral chain are likely contributors. The practical consequence is resource allocation: the receiving facility prepares for one clinical problem and encounters another. A structured feedback loop between ZCMC and its referring facilities, combined with clearer documentation standards, addresses the administrative share of this gap at low cost (Ameyaw et al., 2022; Avoka et al., 2022).

Category-level concordance between referral and final diagnosis is seldom reported for obstetric transfer, although it is well established as a quality measure in pathology, radiology, and consultation-liaison psychiatry. Reporting it here is intended partly to demonstrate its feasibility from routine referral records.

Interpretation should also account for what the cesarean section rate does and does not show. A 40.7% cesarean rate at a tertiary referral center is consistent with a genuinely complicated case mix, but it is a characteristic of the receiving facility's caseload rather than independent evidence that individual referral decisions were correct. It is offered as context, not as validation.

Limitations

Several limitations apply. The Referral Census is a service record rather than a prospectively designed research instrument, so documentation was incomplete and variable. The retrospective design does not support causal inference. Keyword-based matching against the training registry may have missed

training records held under alternate facility names. The study window cannot capture staffing rotations, seasonal patterns, or long-term trends. Most importantly, the registry records training exposure, not competency retention or applied practice. The exploratory facility-level analysis of training status and personnel-trained counts (Table 10) was further limited by a small number of untrained facilities ($n = 12$) and by the association between training status and facility level; the resulting estimates carry wide confidence intervals and should be read as inconclusive rather than as confirmed absence of association. These constraints bound what can be concluded from the data.

What emerges within those bounds is that the central challenge may not be a shortage of trained providers but a mismatch between what those providers know and what their facilities permit them to do. Closing that gap requires treating service readiness, personnel availability, and referral governance as integrated components of a program that currently concentrates almost entirely on provider-level training (Cagayan et al., 2022a; Sy-Cagayan, 2022).

CONCLUSIONS

Strictly non-indicated referrals were uncommon, accounting for fewer than one in ten transfers in this cohort, though sensitivity analysis indicates this estimate could rise to approximately three in ten under worst-case assumptions about referrals with undetermined outcomes (Table 9). Most patients referred to Zamboanga City Medical Center had clinical needs that justified tertiary care. Where avoidable transfers did occur, the drivers were predominantly structural: absent specialists, missing neonatal infrastructure, and referral documentation that recorded no clinical rationale. These are not problems that additional training batches will resolve: an exploratory facility-level analysis found no significant association between BEMONC training status or personnel-trained counts and potentially avoidable referral (Table 10), consistent with this interpretation, although the small number of untrained facilities limits the precision of that estimate.

RECOMMENDATIONS AND IMPLICATIONS

Referral governance should be strengthened at both ends of the chain, with mandatory documentation of the clinical indication for transfer and regular structured feedback from the tertiary hospital to referring facilities. Both measures have empirical support: use of a standard referral form and the presence of referral feedback were the strongest correlates of appropriate maternal referral in a comparable low-resource setting, and referral feedback interventions have been shown to improve collaboration between facilities (Avoka et al., 2022; Sharew et al., 2025). Refresher BEMONC training should be directed preferentially to facilities with high avoidable referral rates. Facilities contributing the largest absolute case volumes need broader service readiness support instead, including workforce augmentation and equipment provision.

The BEMONC training registry, updated after every batch and submitted to the Department of Health, should be maintained as an active database linked to referral performance indicators, so that training investment can be evaluated against functional outcomes rather than participant headcount. Existing national policy instruments governing service capability and provider authority at birthing facilities provide a framework this linkage could sit within (Department of Health [Philippines], 2015; Philippine Health Insurance Corporation, 2010). Prospective facility assessments would provide a stronger basis for understanding how staffing configurations, equipment availability, and organizational factors shape referral behavior across the Zamboanga Peninsula and neighboring communities in geographically isolated and disadvantaged areas. Because the present facility-level test of training status and personnel-

trained counts against referral appropriateness (Table 10) was exploratory and likely underpowered given only 12 untrained facilities, a prospective, adequately powered study is needed before concluding that training coverage has no effect on referral behavior.

List of Abbreviations

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BEMONC: Basic Emergency Obstetric and Newborn Care

CI: confidence interval

DOH: Department of Health

GIDA: geographically isolated and disadvantaged areas

NSVD: normal spontaneous vaginal delivery

OR: odds ratio

PROM: premature rupture of membranes

RHU: rural health unit

STROBE: Strengthening the Reporting of Observational Studies in Epidemiology

ZCMC: Zamboanga City Medical Center

Declarations

Ethics approval and consent to participate. Ethical approval was granted by the Zamboanga City Medical Center Ethics Review Board (ERB Protocol No. ZCMC-ERB-2025-15) on June 19, 2025. Individual informed consent was waived given the retrospective, minimal-risk design and the absence of direct patient contact.

Consent for publication. Not applicable. No individually identifiable patient data are reported.

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Authors' contributions. NTJ and RGU: conceptualization, data curation, formal analysis, methodology, writing of original draft, review and editing, supervision.

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