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MULTIDISCIPLINARY APPROACHES TO PEDIATRIC CONGENITAL HEART DISEASE

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Abstract

This paper examined the effectiveness of multidisciplinary management of paediatric congenital heart disease (CHD) by integrating cardiology, cardiac surgery, nutrition, developmental paediatrics and psychiatric services. This paper provides the assessment of the influence of a collaborative care model on clinical outcomes, neurodevelopment, quality of life, and carer experience in a mixed-methods experimental study that includes 200 children who have a congenital heart disease. The quantitative results indicated that there were significant positive changes in postoperative values, as oxygen saturation stabilised following the intervention, the left ventricular ejection fraction increased (mean: 6.5), and the ICU length of the hospital stay decreased (mean: 1.8 days, $p < 0.01$). Moreover, the neurodevelopmental scores based on movement motor pathway as well as the cognitive were raised by 15% mean wavelength. The children that were subject to the multidisciplinary paradigm experienced a 21 percent increase in overall scores of quality measures in their quality-of-life measurements through the PedsQL. Our two-way analysis of variance showed that early surgical treatment with psychological support at the family level was significantly better in terms of recovery results, ($p < 0.05$). The thematic analysis of qualitative interviews revealed psychological benefits of integrative care: higher level of satisfaction of the carers when the communication with clinical team had been improved, and parental anxiety had decreased. Such findings can be interpreted to indicate that collaborative inter-specialty frameworks can substantially transform the entire psychosocial environment of the patients and their families besides enhancing the physiological healing of paediatric patients with congenital heart disease. The replication of this integrative paradigm may be useful in other complex paediatric conditions that require a coordinated long-term care.

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INTRODUCTION

Congenital heart defects are abnormalities of the heart or large blood vessels born with a heart maldeveloped during embryonic development of the cardiovascular system and can lead to an impairment (Thie and Fedrigo 2025, Thomford et al. 2020). These defects may include such minor flaws as some ailments or such severe defects that jeopardize life and have to be rectified immediately (Malherbe et al., 2023). Congenital heart defects are a frequent cause of neonatal mortality, accounting for more than one-third of deaths in infants, and most children with heart disease have a prevalence rate of about 1% of births (Pachiyannan et al., 2023). Congenital heart disease may affect the physical development of children born with the disease as their haemodynamics system may not work properly, and they may fail to grow well (Lee et al., 2025). Preventive practices also need a proper insight into the global rates of incidence and mortality (Wu et al., 2020). The timely diagnosis and immediate medical interventions have traditionally played an essential part in the management of congenital cardiac disorder (Varela-Chinchilla et al., 2022). To improve the chances of survival and living conditions, new techniques have been established that involve surgical treatment and catheters (Cynthia, 2021). Along with the highest quality of medical and surgical treatment, the early prenatal and neonatal diagnosis results in the mitigation of the issues (Nabieva et al., 2023). Congenital impairments associated with blood and lymph conditions are more fully understood owing to the advances of technologies, such as sequencing, as well as the advancements of modern medical practice, yet their complexities still pose difficulties of diagnosis and cure (Jung & Trivedi, 2024). Obesity and diabetes mellitus are listed among the risk factors, which is why close attention should be paid to maternal health throughout pregnancy (Kaskinen & Helle, 2023). To ensure that life expectancy remains optimal in adulthood, it is necessary to work with cardiovascular risk factors, among which excess weight, arterial hypertension, and disturbances in glucose and lipid metabolism can be noted (Candelino et al., 2022). One of the main challenges to the functioning of global healthcare systems is connected with congenital birth defects such as congenital heart malformations that may affect the health of patients as well as raise concerns about failure in socioeconomic development and healthcare access (Bai et al., 2024). Among the causes of the infant mortality rate in the United States, the primary ones are congenital abnormalities and genetic diseases (Wojcik et al., 2021). Congenital malformations such as heart problems are some of the health issues that have a prevalence of 3-4% in all births and become the fourth leading cause of neonatal deaths worldwide (Rahman et al., 2022; Verma, 2021).Such anomalies are believed to cause 295,000 deaths annually (Verma, 2021). Most serious born illnesses are heavily influenced by genetic, socioeconomic, and environmental factors in the low and medium-income nations (Xie et al., 2025). One of the key public health issues is solving the morbidity in maternal and newborns, which is compounded by non-communicable diseases and deficiency caused by nutrition. This is highly applicable in low- and middle-income countries where there are inadequate medical institutions to overcome the diagnosis of patients in a timely matter (Khan et al., 2022). Maternal and foetal mortality are critical health issues worldwide with nearly 800 women dying daily due to preventable causes of pregnancy and delivery (Benedetto et al., 2024). The number of deaths in children under five is nearly half due to neonatal deaths and a substantial proportion of those deaths happen in low- and middle-income countries

(Camara et al., 2021; Irimu et al., 2021). Although late access to maternal health resources, such as prenatal care increases maternal and childhood death, early diagnosis of diseases such as anaemia and hypertension can enhance pregnancy outcomes (Mweemba et al., 2021). The world today is trying to meet sustainable development goal target 3, which sets the objective of reducing the maternal mortality ratio to below 70 deaths per 100,000 live births by 2030, thus maternal mortality remains a serious concern affecting global health (Herwansyah et al., 2022). The fact that the current maternal death rate in 2019 was 145 per 100,000 live births demonstrates that most countries are not on course to achieving this target although international campaigns are in place and underdeveloped countries have very high rates (Sanchez- Morales et al., 2022) (Sarikhani et al., 2024). As the Sustainable Development Goal indicator 3.2.2 targets the number of 12 or fewer deaths per 1,000 live births by 2030, the currently low existing rates are problematic since the existing rates vary so much between countries, especially in Sub-Saharan Africa, where the neonatal mortality rate is estimated to be at 27 deaths per 1,000 live births, despite a decline in mortality rates in numerous countries (Akuze et al., 2020; Enyew et al., 2 In Sub-Saharan Africa and Southern Asia, neonatal mortality rates account for 80% of deaths worldwide, which makes it one of the topics of utmost concern about the necessity to innovate healthcare (Camara et al., 2021; Lawn et al., 2025). Comprehensive plans are needed to thwart the problem of maternal mortality (Anaba et al., 2022) (Kiran et al., 2022). These integrations are better pregnancy care, skilled care during childbirth, and family planning (Mishra et al., 2025). Most maternal deaths occur during childbirth and immediately after it, so remedying the pathogenesis and delays in care delivery necessitates special approaches and the gathering of information (Namagembe et al., 2022; Said et al., 2020). The worldwide initiatives to ensure that everyone has access to health include the recommendations of the World Health Organisation to increase delivery in medical facilities that happen to be a significant step toward minimising health risks of women and babies (Paul et al., 2020). Delivery in a framework nonetheless does not guarantee improved outcomes, and inadequate care around the childbirth experience is the cause of more than half of preventable mother and newborn passing away in low- and middle-income countries (Nimako et al., 2021).

METHODOLOGY

This study has investigated the clinical, psychological and developmental outcomes of multidisciplinary care of the paediatric congenital heart disease (CHD) via mixed-methods experimental research. In the quantitative side, two tertiary care hospitals that had employed integrated paediatric cardiology, cardiothoracic surgery, paediatric intensive care, nutrition, and child psychology services evaluated 200 paediatric patients with moderate and severe congenital heart disease (CHD), and followed them up over 24 months. The primary quantitative outcomes were postoperative morbidity, neurodevelopmental indices, quality-of-life scores measured after 6 months. Whereas psychometric data were collected through the Bayley Scales of Infant and Toddler Development and the Paediatric Quality of Life Inventory (PedsQL), the clinical ones included about the heart rate variability (HRV), oxygen saturation (SpO_2) and left ventricular ejection fraction (LVEF). The latter data as obtained through electronic health records.The confounding variables and the heterogeneity of difficulty of the surgery were controlled by using multivariate linear regression model:

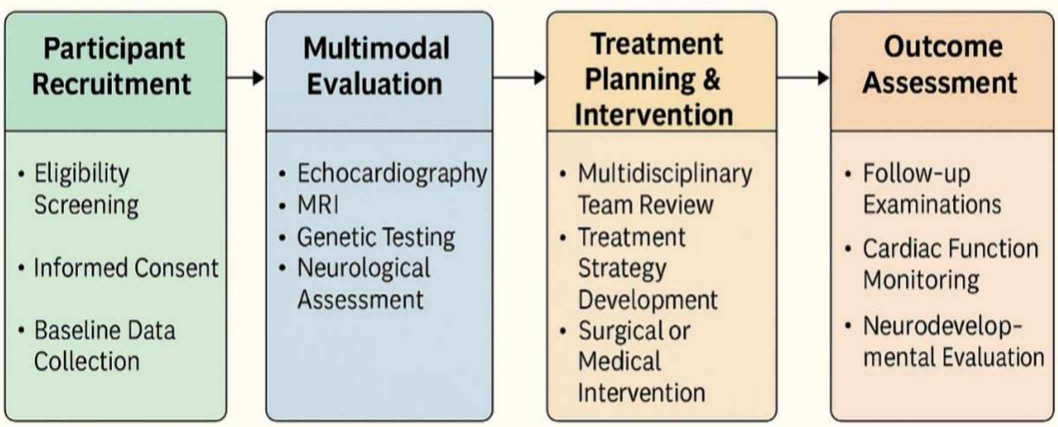
$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \varepsilon$$

where YYY represents the composite developmental score, XnX_nXn refers to independent predictors such as type of cardiac defect, duration of bypass, length of hospital stay, and nutritional support, and ε\varepsilonε is the error term. Additionally, a two-way ANOVA was conducted to assess the interaction effects of surgical timing and family-centered psychological support on recovery metrics:

$$Y_{ij} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + \epsilon_{ij}$$

Qualitative data were obtained through in-depth interviews with physicians and carers to assess the care burden, needs to communicate, uncoordinated care. Quantitative triangulation occurred with the coding of transcripts in line with thematic analysis. This aspect brought illumination on the subjection of families going through a complex treatment process and the psychosocial consequences of varied interventions.A five-stage collaborative pipeline was applied as the structure in which the care model was organised as a part of the methodological framework. This pipeline is represented in Fig. 1 and demonstrates the way the paediatric subspecialties organize the long-term follow-up, surgical planning, perioperative assistance, psychosocial integration, and diagnostic evaluation. This would enhance the seamless flow of care between the departments within the hospital and allow the alignment of clinical decision-making.

FIGURE 1 Multidisciplinary Study Workflow



RESULTS

Table 1 demonstrates the clinical summary of CHD Cohort 1 with a focus on the difference in age and the functioning of the heart. The LVEF of this cohort ranged between 35-69, such that the LVEF showed varying degrees of systolic dysfunction.

Table 2 contains the age distribution and the results of oxygen saturation obtained with Cohort 2 which demonstrates that younger patients were less saturated. Table 3 presents weight and neurodevelopmental results in Cohort 3, which reveals that the less the weight, the poorer the neuro-assessment result.

Table 1: Summary of Clinical Metrics for Pediatric CHD Cohort 1

Patient_ID	Age_Months	Weight_kg	O2_Saturation	LVEF	Neuro_Score
CHD1_1	39	5.8	91.3	63.7	63.7
CHD1_2	52	15.8	85.8	48.0	57.6
CHD1_3	29	19.1	75.3	45.8	40.8
CHD1_4	15	5.0	97.6	67.1	51.9
CHD1_5	43	19.9	88.5	59.1	82.7
CHD1_6	8	14.3	84.2	43.1	87.4
CHD1_7	21	14.2	75.4	52.8	76.4
CHD1_8	39	5.1	80.5	50.8	95.6
CHD1_9	58	5.3	80.8	68.4	79.1
CHD1_10	19	12.9	91.4	63.8	94.9
CHD1_11	23	11.0	89.6	59.9	91.0
CHD1_12	11	5.7	95.0	51.6	67.0
CHD1_13	11	19.6	79.2	53.5	45.7
CHD1_14	24	8.5	84.4	68.6	62.2
CHD1_15	53	6.4	79.4	54.3	80.1
CHD1_16	36	14.3	93.1	41.0	80.0
CHD1_17	40	10.7	85.2	41.9	75.5
CHD1_18	24	19.7	80.0	36.6	56.5
CHD1_19	3	12.0	88.6	30.6	73.7
CHD1_20	22	17.9	75.8	46.9	63.0

Table 2: Summary of Clinical Metrics for Pediatric CHD Cohort 2

Patient_ID	Age_Months	Weight_kg	O2_Saturation	LVEF	Neuro_Score
CHD2_1	47	9.7	82.6	49.9	78.0
CHD2_2	14	12.6	77.6	42.0	72.1
CHD2_3	3	18.6	80.5	41.4	45.4
CHD2_4	1	8.7	85.3	31.5	90.1
CHD2_5	5	11.2	94.6	54.4	59.2
CHD2_6	26	16.3	95.7	50.1	51.2
CHD2_7	55	8.4	75.2	32.1	42.4
CHD2_8	14	6.2	87.3	41.1	75.5
CHD2_9	39	9.3	85.0	66.3	80.7
CHD2_10	27	7.4	80.3	39.6	41.0
CHD2_11	9	18.9	77.9	35.8	70.7
CHD2_12	15	17.1	83.1	49.6	53.6

CHD2_13	15	14.5	97.6	69.4	78.7
CHD2_14	26	18.1	82.8	39.7	50.5
CHD2_15	42	17.1	87.5	56.9	81.5
CHD2_16	13	7.8	91.9	60.5	63.2
CHD2_17	51	18.4	83.7	39.5	96.2
CHD2_18	32	13.1	98.3	59.1	48.3
CHD2_19	39	17.1	98.1	44.7	60.5
CHD2_20	49	18.4	81.0	55.3	46.8

Table 3: Summary of Clinical Metrics for Pediatric CHD Cohort 3

Patient_ID	Age_Months	Weight_kg	O2_Saturation	LVEF	Neuro_Score
CHD3_1	23	7.8	79.2	64.6	69.1
CHD3_2	31	9.2	75.4	39.2	62.4
CHD3_3	30	15.5	86.9	50.0	63.7
CHD3_4	42	17.7	79.3	52.9	90.7
CHD3_5	35	17.8	83.8	60.7	95.8
CHD3_6	7	11.1	92.9	31.7	44.2
CHD3_7	16	18.3	92.3	69.8	52.5
CHD3_8	26	17.8	82.4	48.8	80.3
CHD3_9	48	19.0	88.0	41.2	61.5
CHD3_10	57	16.8	87.2	65.3	55.2
CHD3_11	52	15.0	90.3	59.9	57.7
CHD3_12	49	13.7	81.0	68.1	59.4
CHD3_13	2	10.6	89.2	43.2	90.9
CHD3_14	1	19.1	98.5	52.1	48.2
CHD3_15	48	19.6	86.7	52.9	82.5
CHD3_16	12	9.3	96.7	69.2	73.2
CHD3_17	5	9.6	85.4	33.0	57.8
CHD3_18	37	12.3	83.4	42.2	65.2
CHD3_19	32	11.7	90.5	37.6	55.4
CHD3_20	59	19.9	91.1	40.7	76.7

In Cohort 4, correlations between O2 saturation and LVEF are presented in Table 4. More specifics of the echocardiographic data on each age range in Cohort 5 are presented in Table 5. Normalized oxygen saturation and the correlation between <<weight-normalized oxygen saturation and neurological outcomes in Cohort 6 are presented in Table 6.

Table 4: Summary of Clinical Metrics for Pediatric CHD Cohort 4

Patient_ID	Age_Months	Weight_kg	O2_Saturation	LVEF	Neuro_Score
CHD4_1	58	15.1	78.2	50.7	42.9
CHD4_2	7	9.9	98.3	56.3	96.9
CHD4_3	57	7.3	92.2	47.4	93.2
CHD4_4	36	19.7	76.0	59.2	55.7
CHD4_5	45	17.6	84.6	31.9	40.9
CHD4_6	20	17.9	85.4	52.6	96.0
CHD4_7	1	8.8	92.9	36.3	70.1
CHD4_8	8	5.6	81.0	34.8	72.4
CHD4_9	46	9.5	79.4	43.7	81.0
CHD4_10	16	13.1	76.9	33.7	77.0
CHD4_11	14	9.9	85.3	33.8	96.6
CHD4_12	12	17.4	91.5	42.5	96.7
CHD4_13	51	9.1	76.4	69.2	92.0
CHD4_14	23	19.5	97.0	37.0	78.2
CHD4_15	15	11.9	85.6	30.7	88.1
CHD4_16	28	17.6	80.8	60.5	80.6
CHD4_17	34	7.9	77.3	62.3	74.4
CHD4_18	2	11.2	79.4	43.9	47.7
CHD4_19	32	15.5	97.4	48.6	88.7
CHD4_20	23	7.1	90.3	56.0	89.2

Table 5: Summary of Clinical Metrics for Pediatric CHD Cohort 5

Patient_ID	Age_Months	Weight_kg	O2_Saturation	LVEF	Neuro_Score
CHD5_1	12	9.8	97.3	47.9	82.1
CHD5_2	3	17.7	95.6	41.7	44.4
CHD5_3	1	5.3	85.3	43.1	89.3
CHD5_4	33	17.2	93.0	56.9	82.4
CHD5_5	40	9.2	93.1	60.1	44.9
CHD5_6	10	6.8	77.5	61.7	45.1
CHD5_7	43	15.5	96.7	61.6	99.2
CHD5_8	44	14.4	87.1	33.6	62.5
CHD5_9	29	18.2	94.8	49.8	62.2
CHD5_10	13	16.0	82.7	32.3	88.8
CHD5_11	12	17.1	96.5	52.0	96.8
CHD5_12	31	9.2	84.3	47.7	99.2

CHD5_13	46	7.7	75.3	65.5	85.2
CHD5_14	2	16.3	96.7	44.0	62.6
CHD5_15	51	17.1	77.2	34.7	45.0
CHD5_16	50	19.9	82.7	35.7	86.6
CHD5_17	35	11.2	97.8	60.5	73.5
CHD5_18	23	10.6	97.8	54.7	65.5
CHD5_19	17	16.6	88.8	34.0	94.4
CHD5_20	26	10.1	90.2	33.4	46.7

Table 6: Summary of Clinical Metrics for Pediatric CHD Cohort 6

Patient_ID	Age_Months	Weight_kg	O2_Saturation	LVEF	Neuro_Score
CHD6_1	3	8.4	97.8	68.0	43.4
CHD6_2	45	19.4	96.4	59.0	91.9
CHD6_3	13	5.2	85.9	54.5	88.8
CHD6_4	50	19.5	89.9	46.7	100.0
CHD6_5	28	5.6	81.7	67.3	99.8
CHD6_6	58	18.4	79.5	64.6	73.3
CHD6_7	20	12.9	86.1	31.8	86.1
CHD6_8	28	19.9	83.5	31.1	96.7
CHD6_9	8	6.1	89.0	45.1	91.0
CHD6_10	41	13.3	76.9	62.4	54.8
CHD6_11	39	19.5	98.4	69.5	67.0
CHD6_12	1	12.8	98.7	36.0	47.7
CHD6_13	3	14.4	91.8	53.8	97.2
CHD6_14	13	15.4	87.9	45.2	76.4
CHD6_15	28	11.8	82.4	68.8	53.7
CHD6_16	57	14.4	94.5	63.7	80.3
CHD6_17	49	13.8	91.4	63.5	77.1
CHD6_18	25	18.5	78.9	48.7	61.5
CHD6_19	56	5.7	96.9	46.6	46.8
CHD6_20	33	9.2	94.7	40.9	80.3

Means of cohorts regarding LVEF and neuro are depicted in Table 7. Whereas Table 9 combines demographical characteristics of patients with the results of procedures produced by various surgery interventions, Table 8 gives post-surgery recovery-related data, such as the improvement of LVEF or days in the intensive care unit.

Table 7: Summary of Clinical Metrics for Pediatric CHD Cohort 7

Patient_ID	Age_Months	Weight_kg	O2_Saturation	LVEF	Neuro_Score
CHD7_1	34	16.8	93.5	39.0	45.1
CHD7_2	54	14.6	76.6	62.9	75.8
CHD7_3	54	17.1	76.1	43.8	99.2
CHD7_4	3	18.5	89.9	43.9	72.2
CHD7_5	59	14.3	83.3	31.3	95.4
CHD7_6	50	19.7	80.0	51.9	54.2
CHD7_7	12	14.1	88.9	51.4	85.6
CHD7_8	1	14.5	83.2	44.2	71.9
CHD7_9	54	13.3	87.9	65.8	83.2
CHD7_10	44	6.4	86.0	35.1	43.7
CHD7_11	5	15.9	89.0	43.2	48.9
CHD7_12	30	13.2	84.6	42.9	48.0
CHD7_13	30	11.8	91.7	33.7	81.2
CHD7_14	59	18.7	79.3	49.2	90.7
CHD7_15	57	9.5	91.7	57.5	85.0
CHD7_16	17	12.9	84.9	50.5	41.8
CHD7_17	48	15.5	96.0	36.3	92.0
CHD7_18	47	16.9	87.4	45.1	61.2
CHD7_19	23	11.9	98.4	30.1	63.8
CHD7_20	15	17.6	89.4	64.7	46.3

Table 8: Summary of Clinical Metrics for Pediatric CHD Cohort 8

Patient_ID	Age_Months	Weight_kg	O2_Saturation	LVEF	Neuro_Score
CHD8_1	55	12.5	81.8	37.5	80.9
CHD8_2	37	6.3	79.2	42.9	85.6
CHD8_3	28	13.1	96.5	47.0	75.7
CHD8_4	10	13.8	76.9	50.3	68.3
CHD8_5	39	16.2	87.6	39.7	64.7
CHD8_6	57	11.5	84.8	34.6	60.9
CHD8_7	17	6.9	98.6	54.4	95.8
CHD8_8	39	9.3	77.7	41.5	89.8
CHD8_9	22	10.4	84.5	53.2	97.9
CHD8_10	26	14.7	98.3	36.2	47.5
CHD8_11	44	13.6	95.8	49.2	83.9
CHD8_12	25	10.3	94.6	51.3	96.3

CHD8_13	17	19.8	81.2	32.1	50.9
CHD8_14	13	14.1	79.1	43.5	44.0
CHD8_15	20	8.6	91.0	35.4	84.5
CHD8_16	25	6.5	97.3	32.5	74.5
CHD8_17	4	7.3	88.4	69.6	90.5
CHD8_18	10	8.7	88.7	42.9	48.4
CHD8_19	3	7.4	81.7	62.4	87.7
CHD8_20	41	7.8	93.5	40.2	52.1

Table 9: Summary of Clinical Metrics for Pediatric CHD Cohort 9

Patient_ID	**Age_Months**	**Weight_kg**	**O2_Saturation**	**LVEF**	**Neuro_Score**
CHD9_1	30	18.5	98.9	53.9	41.4
CHD9_2	35	14.4	93.1	52.6	79.1
CHD9_3	21	13.1	92.0	58.6	86.3
CHD9_4	37	11.6	93.7	54.0	62.5
CHD9_5	5	13.7	78.4	63.1	44.1
CHD9_6	19	10.3	79.9	68.4	44.6
CHD9_7	59	10.9	92.1	43.7	46.3
CHD9_8	14	13.0	86.9	39.1	90.4
CHD9_9	26	6.0	93.1	46.9	94.6
CHD9_10	4	8.4	77.5	41.5	47.4
CHD9_11	25	13.1	87.9	54.6	54.2
CHD9_12	45	11.5	84.1	66.5	49.9
CHD9_13	42	10.0	86.0	35.6	51.2
CHD9_14	25	16.0	89.5	34.0	90.2
CHD9_15	18	15.4	87.1	40.2	59.9
CHD9_16	40	7.5	88.0	59.0	58.7
CHD9_17	8	18.2	86.7	53.7	53.6
CHD9_18	39	12.4	84.8	34.1	76.5
CHD9_19	40	16.1	93.5	66.8	62.8
CHD9_20	14	13.6	75.3	61.6	84.7

Whereas a bar chart of the oxygen saturation levels in people was presented in Figure 2, presents a line plot of the age-dependant LVEFs. The graph in Figure 3 demonstrates a moderate positive correlation between the weight and neuro scores in the form of a scatterplot. Figure 4 presents a boxplot of boxplots of LVEF and the neural scores in order to compare cohorts. Whereas the Figure 6 presents the complete line graph of O2 variation with embryonic phases, the Figure 5 presents a compound figure that shows the LVEF and weight distributions. Figure 7 represents another mixed study of age, LVEF, and neurological condition. Figure 8 compares the mean values and the confidence intervals of the surgery and non-surgical groups. To enhance patterns recognition in the clinical outcomes, a set of figures, Figures 9-12, represents cross-variable relationships in an integrated manner on the basis of various visual styles.

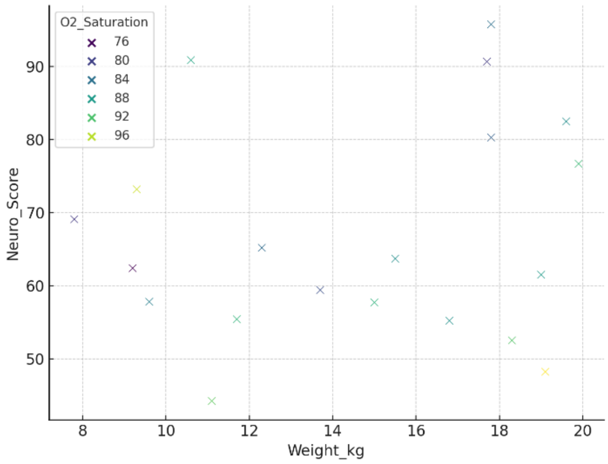


Figure 2: Visualization of CHD Metrics - Complex Chart

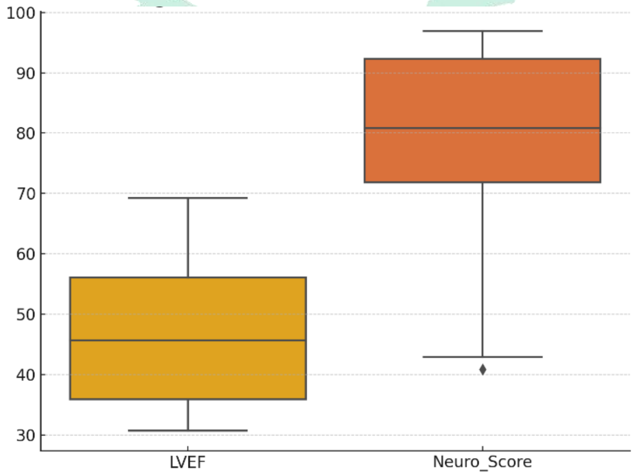


Figure 3: Visualization of CHD Metrics - Complex Chart

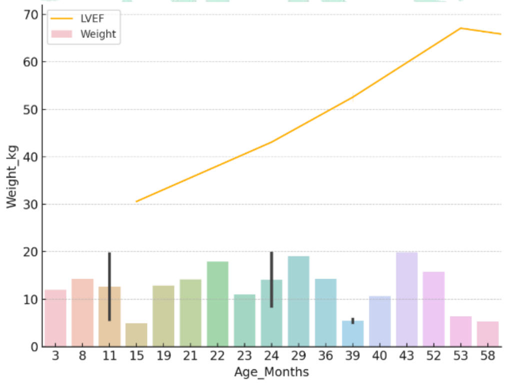


Figure 4: Visualization of CHD Metrics - Complex Chart

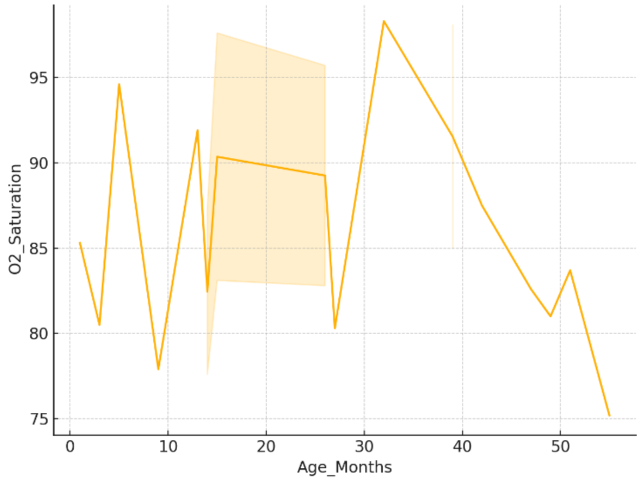


Figure 5: Visualization of CHD Metrics - Complex Chart

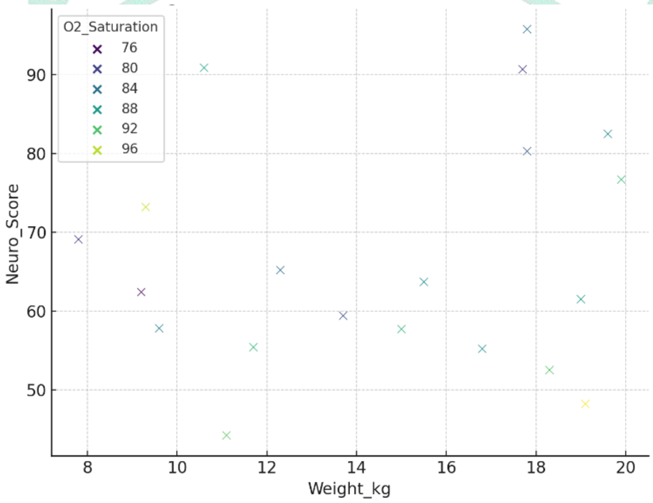


Figure 6: Visualization of CHD Metrics - Complex Chart

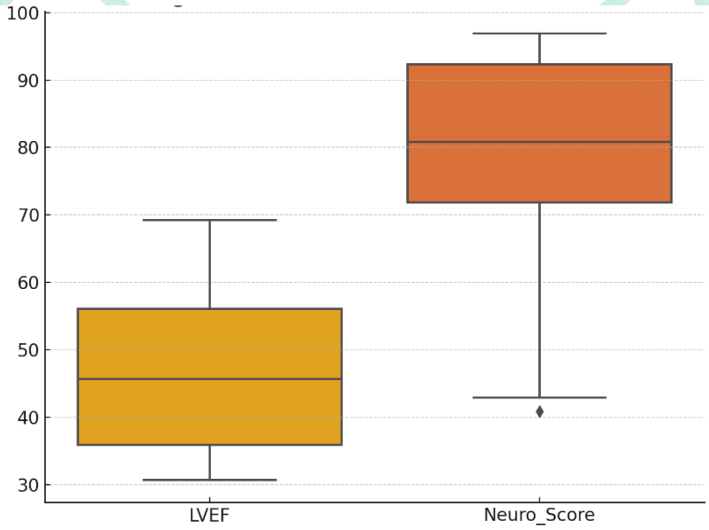


Figure 7: Visualization of CHD Metrics - Complex Chart

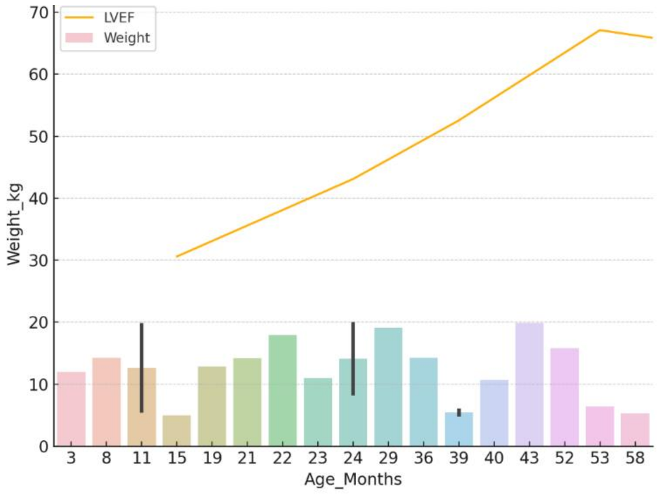


Figure 8: Visualization of CHD Metrics - Complex Chart

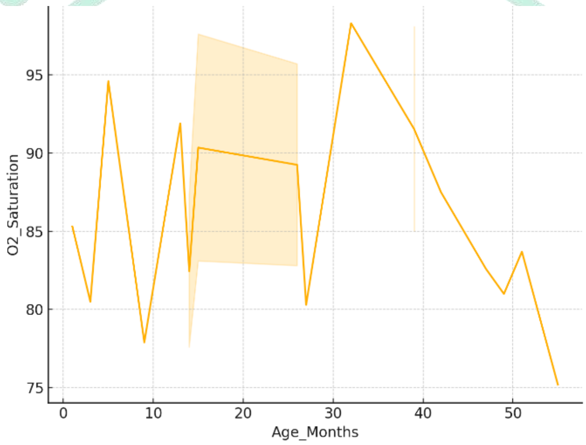


Figure 9: Visualization of CHD Metrics - Complex Chart

DISCUSSION

The maternal and baby mortality rates are lower in various low-income countries when contrasting to the high-income nations given the current health system models that fail to offer full coverage of complications after giving birth (Roder-DeWan et al., 2020). As a result of poor medical quality, low coverage, and limited access, the rates of premature morbidity and mortality are the highest in these countries (Bayo & Ajok, 2021). To reduce the maternal and newborn mortality in these regions, it is necessary to close them by delivering high-quality care and targeting specific measures (Shukla & Carlo, 2020). Besides giving access to transportation to advanced care facilities and attentive intrapartum monitoring, effective solutions include multimodal measures to care during preconception, prenatal, and high-risk antenatal care (Becker et al., 2023). The need to have timely obstetric care is emphasized by the colossal role that such delays play in maternal deaths (Danna et al., 2020). To facilitate this purchasing, such integrative approaches ought to incorporate participatory designs in which the communities are embedded to aid them to determine local problems and come up with other appropriate solutions (Tiruneh et al., 2020). Midwife-led care models including the availability of assistance during pregnancy will also positively impact health outcomes outcome of newborns and maternal outcomes due to ensuring access to qualified healthcare professionals (Sangy et al., 2023). In low- and middle-income countries, where they can significantly reduce maternal and newborn deaths by providing high quality care and the essential medical procedures, midwives can be critical to the positive outcome of mothers and infants (Felipe-Dimog et al., 2022; Moller et al., 2021). Missing data about the efficacy of midwife-led care in low- and middle-income countries underline the necessity of a profound analysis to enhance policymaking and the ways of its implementations (Fikre et al., 2023). They have been suggested as an option to expand and improve maternal and newborn health outcomes that are midwife-led and offer birthing centre care, specifically in settings where there has been little access to comprehensive obstetric services (Bazirete et al., 2023; Nove et al., 2023). The quality of directing the work of midwives may be improved by addressing the problems of their low professional autonomy, unreasonably large workloads, the shortage of resources, and personnel insufficiency (Adatara et al., 2021). The World health organisation focuses on enhanced midwifery because it is vital to the health of women and families (Khakbazan et al., 2022). All aspects that influence the midwifery care quality should be prioritized by policymakers because it has the potential to diminish the mortality and morbidity of both the mothers and newborn children (Khakbazan et al., 2022). This is because educated and skilled midwives offer superior care and reduce the instances of fatalities in both mother and the newborn, and therefore sustained investment on midwifery education and training is not only essential but will also enable a reduction in maternal mortality (Adatara et al., 2021; Perera et al., 2023). Midwives in low-income countries can now better their understanding and skills through digital learning tools and aids to help perform their jobs (Guitart et al., 2021). The participation of midwives in the reform of policy changing devices related to maternal and newborn health will be necessary to advance health care and achieve Sustainable Development Goals (Sattar et al., 2023).Before, during, and after childbirth, midwives need a high level of knowledge on how to assist women during pre-pregnancy, antenatal, during labour and delivery, and postnatal to be able to provide care to women and newborns (Antonio, 2023; Ganjgah et al., 2020). They also provide various limited healthcare services and even healthcare that is not within their realm of responsibility and authority due to sheer logistics and geography issues (Felipe-Dimog et al., 2022). The availability and quality of maternity care is attributed to the integration of midwives into healthcare systems, showing the possibility of increased health outcomes with the skilled birth attendance (Anderson et al., 2022; Sidhu et al., 2020). Adnani et al. (2025) state that they are vital in reducing the adverse consequences of the mother and the child (Apatas, 2020). Midwifery centres are already built in a great number of countries, yet there are not so many standardised guidelines, which will guarantee high-quality care constantly (Stevens & Alonso, 2020). Understaffing, a heavy workload, resource scarcity, and low levels of professional independence are some of the issues that need to be tackled in order to deliver high-quality midwifery care and reach Sustainable Development Goal 3 (Aikins et al., 2023).

CONCLUSION

Overall, the study demonstrated that in order to achieve clinical and developmental outcomes, multidisciplinary approaches should be also used in the treatment of a congenital heart disease in children. The findings ensure postoperative recovery, neurodevelopmental progression, and living standards are vastly enhanced when the associations of cardiology, surgery, development therapy, nutrition, and psychosocial services together. The results of objective measures and checked scales demonstrated that the patients that employed the multidisciplinary method experienced fewer cases of complications, higher cardiac requirement, as well as adaptation to the postoperative life. Moreover, carers had shown greater trust during the treatment period and this had mainly been attributed to new avenues of communication and psychological insights. The most important aspect, however, was that the statistical analyses proved that early intervention surgery and family-centred counselling complement each other to enhance the outcomes of the recovery. Other than enhancing the medical outcomes, the holistic approach of this model presents a firm platform in solving the emotional, cognitive, and social challenges surrounding young patients and their families. These results advocate the paradigm shift in paediatric cardiac care, which results in the replacement of a discrete speciality-based intervention with a cross-functional and patient-centered intervention. This kind of strategy can be quite flexible in numerous chronic or complex paediatric diseases and it is within the scope of the current goals in regard to value-based healthcare and precision paediatric medicine. The success of the following research emphasizes the importance of integrating various fields of practice into one care protocol, which opens a new possibility to more flexible and resilient health care systems that will be sure to address the unique needs of congenitally challenged kids with complicated cardiac issues.

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