PAKISTAN CHILDREN'S HEART FOUNDATION
DATA REVIEW

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CENTER FOR RESEARCH
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IN-PATIENT CARE: THE SPECTRUM OF CONGENITAL HEART DISEASES AT PAKISTAN CHILDREN'S HEART FOUNDATION IN THE LAST 5 YEARS

Executive Summary

- **PCHF patient database was used to identify the spectrum of CHDs at PCHF over the past 5 years.**
- **The database was also used to estimate the relative frequency of each CHD.**
- **In the past 5 years, the spectrum of CHDs at PCHF included 19 defects. There was an isolated case of pericardial effusion which was treated at PCHF but not included in the results of this brief.**
- **A total of 1959 patients were operated on.**
- **A stacked area graph, pareto chart and bar graph were used to represent the results of the data.**

Key findings

- **65% of the patients had acyanotic lesions. Making acyanotic CHDs the more prevalent CHD group.**
- **Overall, the most common acyanotic lesion was VSD, at 29.7%. The most common cyanotic lesion was TOF, at 25.0%.**
- **Overall, the least common acyanotic CHDs were dextrocardia (abnormal position of the heart) and ALCAPA, at 0.05%. The least common cyanotic CHD was right atrial isomerism (isomerism), at 0.13%.**
- **In 2018, ASD was the most common acyanotic lesion. However, the difference was minute, at 2.36%**
- **The results from this data analysis are similar to the results of 5 other studies. Three of these studies, Zahid et al (2013), Arshad et al (2020) and Pate et al (2016) were from LMICs. Two studies, Abbag, F. (1998) and Hoffman, J. I. (1990), were from HICs.**
- **According to the pareto line, emphasis should be on four CHDs, from most to least order of importance- VSD, TOF, ASD and TGA. By directing quality improvement efforts on the following CHDs, maximum impact on improving overall health outcomes can be achieved.**

Policy implications

- **The results of this brief can be integrated into PCHF's value-based healthcare model by customizing each patient's management plan.**
- **VSD, TOF, ASD and TGA patients can be assessed as 'high risk groups.'**
- **Further research should be focused on the etiology of CHDs in these high-risk groups. Better identification can assist efforts to reduce their incidence in the population.**
- **Early detection should be centered on these high-risk groups.**
- **Streamlining and tailoring management plans for these groups can improve quality and efficiency in the CHD health sector.**

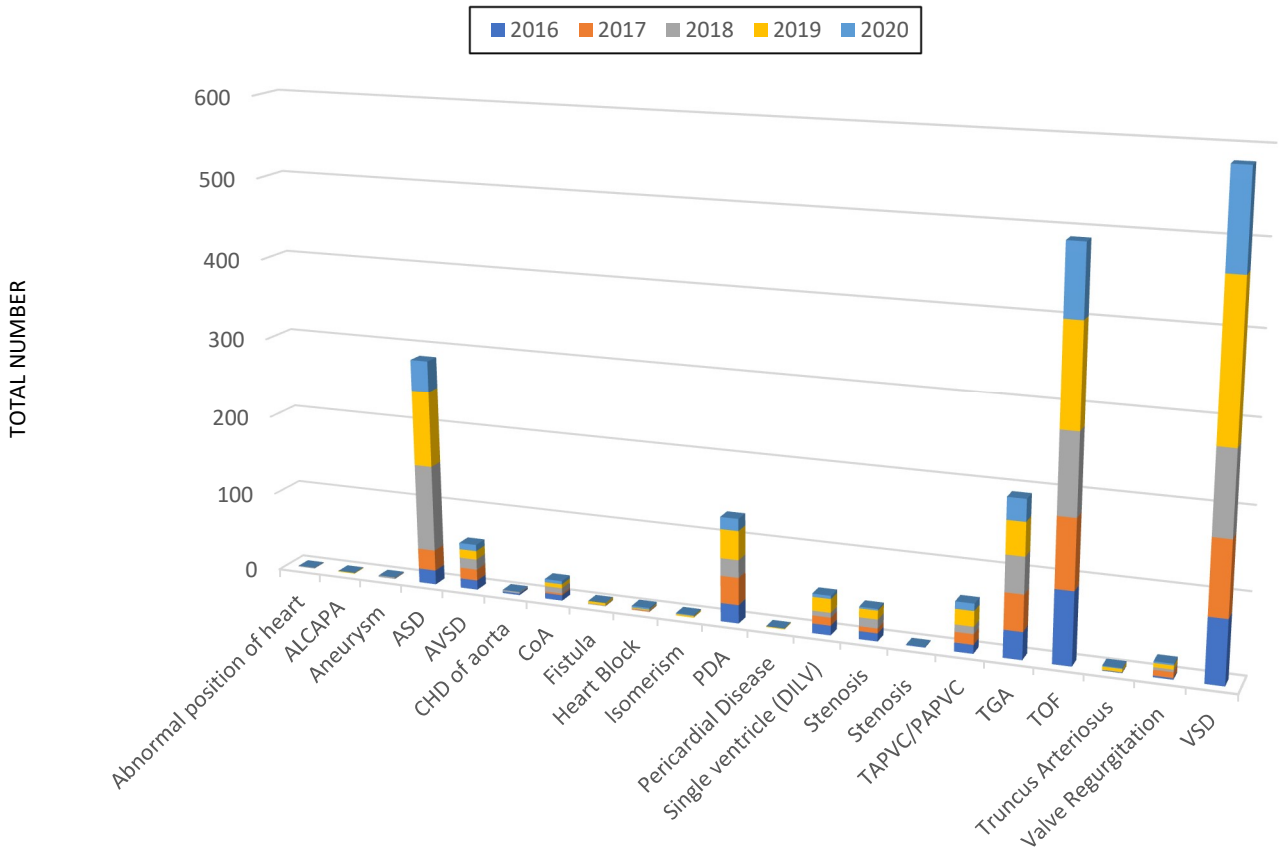
Future trends

- **Prospective research based on the questions: will the spectrum of CHDs change in the next 5 years? What reasons can be identified?**
- **The next step would also be to explore the spectrum of mixed cardiac lesions and complex CHDs at PCHF.**

PCHF PATIENT DATA ON THE SPECTRUM OF CHDs RECORDED

Type of CHD	2016	2017	2018	2019	2020	Total	Frequency	Classification
Abnormal position of the heart			1			1	0.05%	acyanotic
ALCAPA				1		1	0.05%	acyanotic
Aneurysm			2			2	0.10%	acyanotic
ASD	18	26	108	95	39	286	14.5%	acyanotic
AVSD	12	14	13	11	8	58	2.96%	acyanotic
CHD of aorta	2		2			4	0.20%	acyanotic
CoA	7	2	7	5	4	25	1.28%	acyanotic
Fistula			1	3		4	0.20%	acyanotic
Heart Block		1	1	1	2	5	0.26%	acyanotic
Isomerism				2	1	3	0.15%	cyanotic
PDA	23	34	22	36	15	130	6.64%	acyanotic
Pericardial Disease				1		1	0.05%	N/A
Single ventricle (DILV)	12	10	6	17	4	49	2.50%	cyanotic
Stenosis	11	6	11	11	2	41	2.09%	acyanotic
TAPVC/PAPVC	11	13	9	19	9	61	3.11%	cyanotic
TGA	34	45	45	41	27	192	9.80%	cyanotic
TOF	90	86	100	126	87	489	25.0%	cyanotic
Truncus Arteriosus	1			4	1	6	0.31%	cyanotic
Valve Regurgitation	2	7	3	5	2	19	0.97%	acyanotic
VSD	79	92	103	191	117	582	29.7%	acyanotic
Total	**302**	**336**	**434**	**569**	**318**	**1,959**		

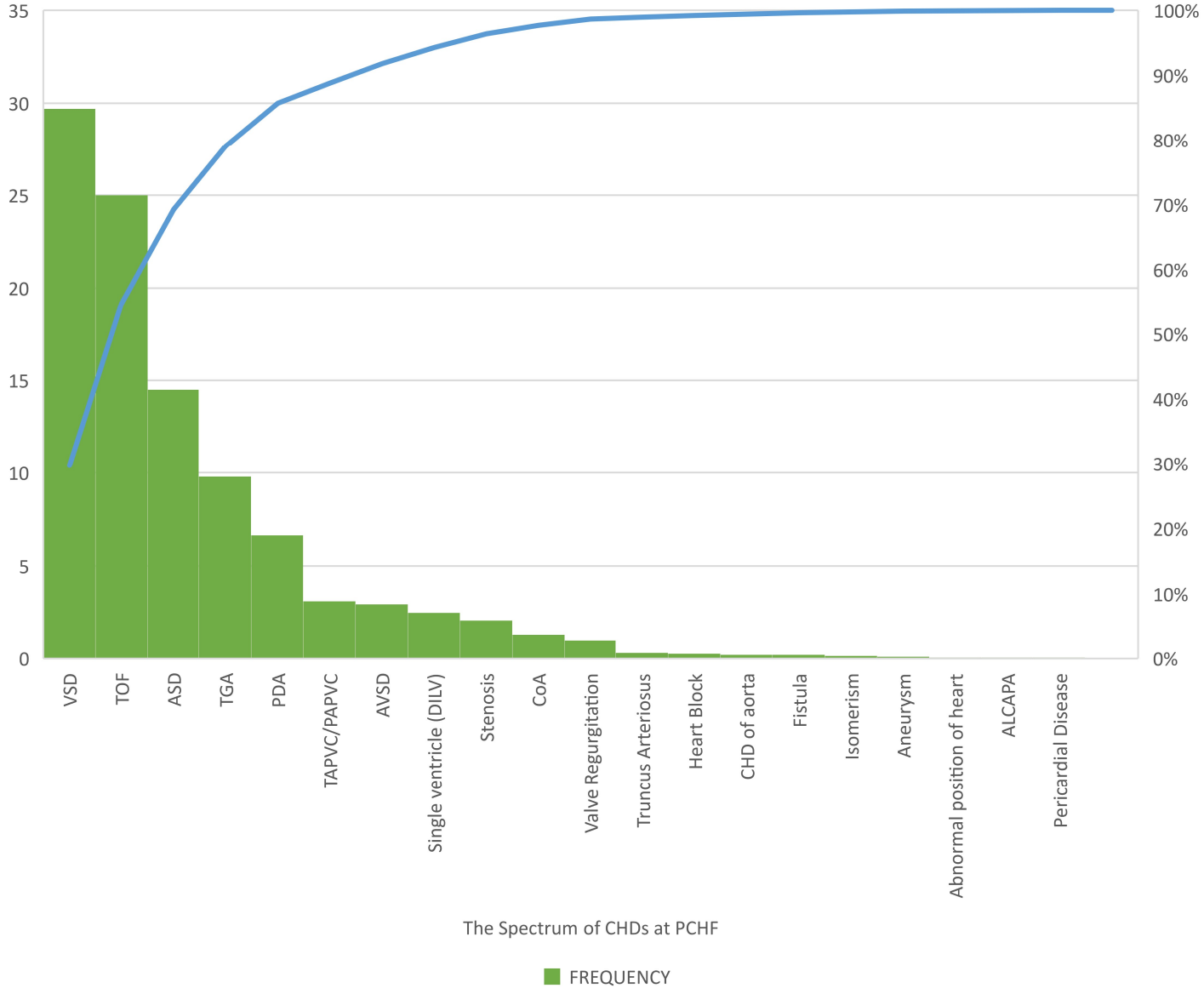
FIGURE 1: A STACKED AREA GRAPH OF THE SPECTRUM OF CHDs AT PCHF



- The x-axis of the bar graph shows the spectrum of CHDs at PCHF to include 19 CHDs. The isolated case of pericardial disease was a readmission of a case of ASD treated earlier. Hence, it is not included in the spectrum as it is an acquired heart disease.
- The color of the shaded portion of each graph corresponds to the total number of cases recorded in each individual year. A total of 19 CHDs are recorded in the spectrum of CHDs at PCHF over the last 5 years.
- The highest total number of cases were recorded in 2019. This can be seen by the yellow shaded area in each bar.
- The height of each bar represents the highest total number of cases over the previous 5 years. The significant peaks can be listed as the following in descending order:
  1) VSD
  2) TOF
  3) ASD
  4) TGA
  5) PDA
  6) TAPVC/PAPVC
  7) AVSD
  8) DILV
  9) STENOSIS
  10) CoA

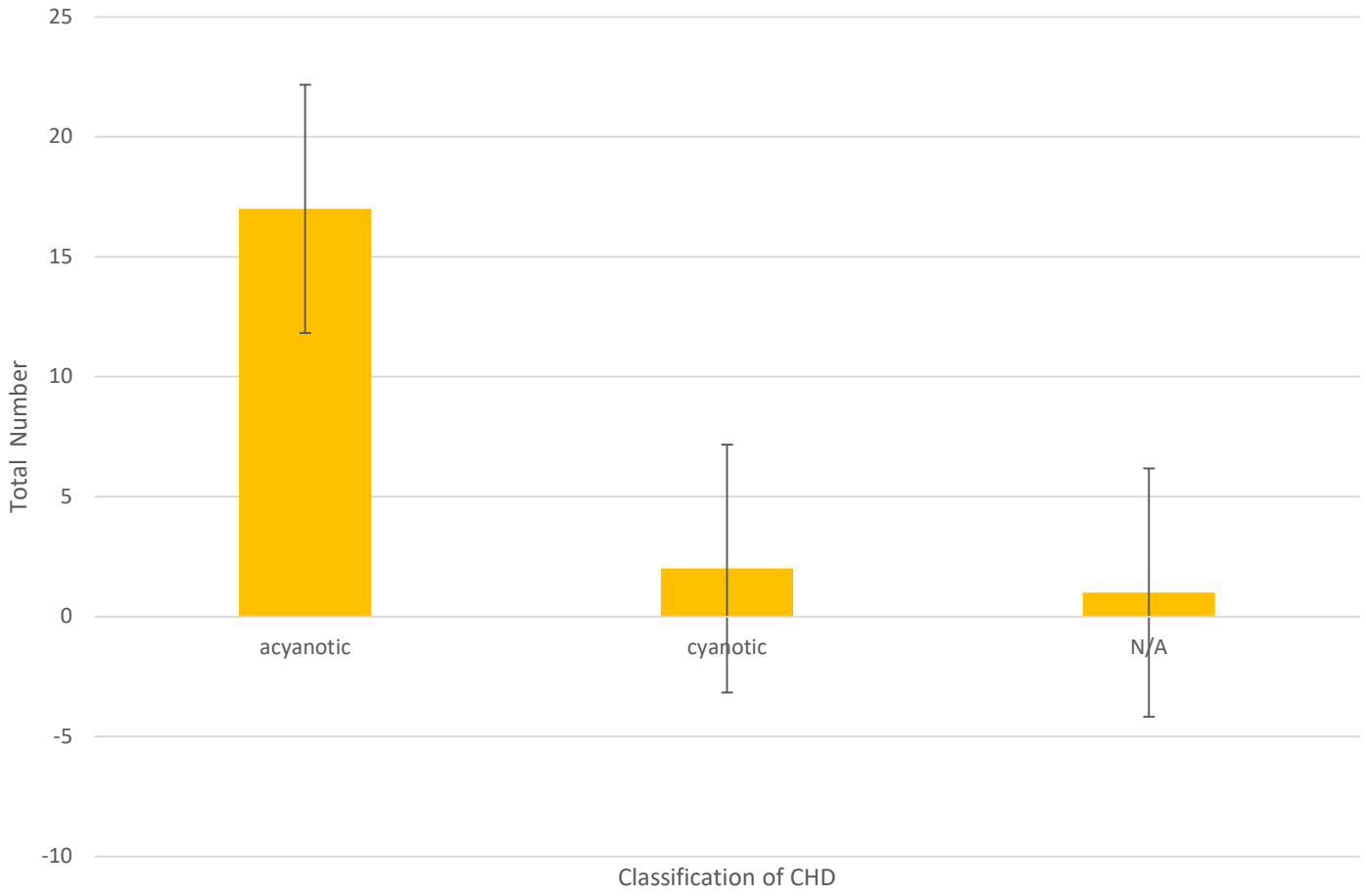
- The difference in shaded areas for each individual CHD over the 5 years, ranges from 2-5%. This range is not significant. Therefore, there is consistency in the frequency of occurrence of these CHDs over the last 5 years.

FIGURE 2: A PARETO CHART OF THE FREQUENCY of DISTRIBUTION of the SPECTRUM OF CHDs AT PCHF



- The bar graph in the pareto chart shows the frequency of occurrence of the particular type of CHD in descending order.
- The bar graph shows that VSDs have the highest frequency in the spectrum, at 29.5%. ALCAPA, dextrocardia (abnormal position of the heart) and pericardial effusion have the lowest frequency, at 0.05%.
- The blue line, or pareto line, shows a downward concave. This means that the portion of the blue line above the green bars that is arched the most refers to the CHD lesions that have the highest percentage of the total spectrum of recorded CHDs. When the blue line becomes straight, it shows that the contribution of each green bar is about even.
- The division between the CHDs that have the most impact on patient outcomes vs those that have less impact have been demarcated by a yellow dotted line.
- Concentrating on the area on the left side of the yellow line will result in the most improvement.

FIGURE 3: A BAR GRAPH OF THE FREQUENCY OF CHDs BY CHD CLASSIFICATION AT PCHF



- The highest total number of CHDs recorded are acyanotic CHDs, represented by the first bar.
- The third bar denotes a patient treated by PCHF who was diagnosed with pericardial effusion. Since this falls under acquired heart disease, it is demarcated as 'not applicable or N/A'.
- The vertical lines denote the 'margin of error.' In this bar graph, they show one standard deviation of uncertainty. The objective of the margin of error is to display the precision of the recorded data.

Glossary

Cyanotic CHD: CHDs that lower the blood oxygen level

Acyanotic CHD: CHDs that do not affect the blood oxygen level

Pareto chart: A graphical representation of data that shows both the frequencies of defects and the cumulative effect.

Stacked area graph: A graph that depicts different data series, with the area under the graph representing the sum of the variable

Value Based Healthcare: A healthcare service delivery model where health professionals are reimbursed based on quality of care and health outcomes.

High Risk Group: The most prominent group in the population with similar disease traits.

Abbreviations

PCHF: Pakistan Children's Heart Foundation

CHD: Congenital Heart Disease

VSD: Ventricular Septal Defect

ASD: Atrial Septal Defect

TOF: Tetralogy of Fallot

TGA: Transposition of the Great Arteries

PDA: Patent Ductus Arteriosus

CoA: Coarctation of the Aorta

TAPVC/PAPVC: Total Anomalous Venous Connection/ Partial Anomalous Venous Connections

AVSD: Atrioventricular Septal Defect

ALCAPA: Anomalous Left Coronary Artery from the Pulmonary Artery

DILV: Double Inlet Left Ventricle

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