

Can Decentralized Community Rapid Cardiac Ultrasound Triage Reduce Carbon Footprint? Environmental Insights From the Heart2Miss Study

Footprint? Environmental Insights From the Heart2Miss Study

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BACKGROUND

- Early heart failure (HF) detection in high-risk diabetes patients → crucial for better treatment outcomes.
- Limited access to transthoracic echocardiographic at specialized tertiary center:
 - ↑ Diagnostic burden, ↑ travel distance, ↑ CO₂e
- Initiative: **Heart2Miss study** leveraged **AI-powered POCUS and telehealth for decentralized rapid TTE triage in primary care** → enhancing accessibility, early HF detection and improve outcomes.

PURPOSE

To compare environmental carbon footprint of decentralized community rapid triage vs modeled conventional tertiary pathway.

Real-world local single tertiary cardiology center serving 700,000 population in a single city.

METHODS

- Interviewed 716 patients underwent triage TTE in **primary care**: collected data on **travel distance** (primary, intermediary, tertiary centers) + **transport mode** (patient and caregiver).
- Conventional pathways modeled based on the real-world referral system to a single tertiary center within the same city, without the decentralized system.
- Adapted Excel tools¹**: Calculate the travel distance (return km, via Google Maps) and carbon emissions (2023 BEIS factors) for both pathways.

STUDY POPULATION

716
Patients Interviewed

55.3%
Women


62 ± 11 years
Mean Age (years)


63.7%
Attended Alone


36.3%
Attended with carer (s)


MODE OF TRANSPORT


To primary care

 **80.3%**
Own Car

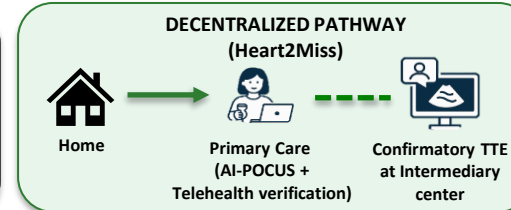
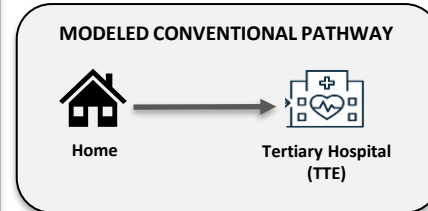
 **12.6%**
Motorbike

 **3.4%**
Bus

 **2.8%**
Taxi

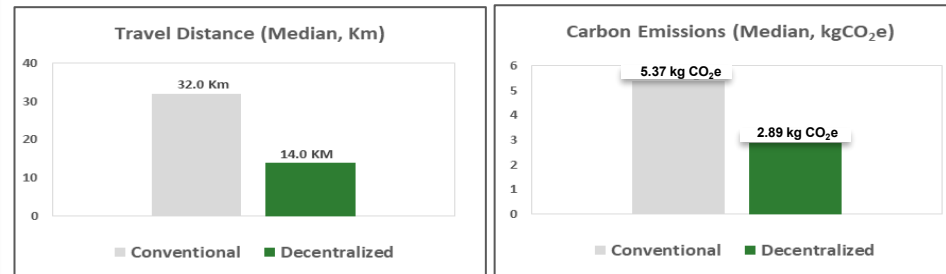
 **1.0%**
Walk

THE PATHWAYS



RESULTS (1)

OVERALL ENVIRONMENTAL IMPACT: CONVENTIONAL vs DECENTRALIZED



53% Less Distance travelled
17.0 KM Median Distance Saved per patient

39% Less carbon emission
2.11kg CO₂e Median Carbon Emissions Saved per patient

Data presented as % and Median.

CONCLUSION

Decentralized TTE triage **significantly reduced** travel distance and carbon emissions for most patients (**77.4%**) triaged at primary care.

RESULTS (2)

77.4% HAD SIGNIFICANTLY LOWERED TRAVEL DISTANCE AND CARBON EMISSIONS

Normal TTE at Primary Care | No Confirmatory TTE Required
Managed at Primary Care

	Conventional	Decentralized	
Distance	33.0 KM	11.41 KM	$p < 0.001$
CO ₂ e	5.41 kg CO ₂ e	2.35 kg CO ₂ e	$p < 0.001$

Significantly lower

22.6% Abnormal TTE required confirmatory TTE at intermediary center

	Conventional	Decentralized	
Distance	27.90 KM	27.80 KM	$p = 0.931$
CO ₂ e	5.26 kg CO ₂ e	5.23 kg CO ₂ e	$p = 0.662$

No significant difference

All data presented as Median.

IMPLICATION

- This represents a sustainable HF detection in high-risk diabetes populations.
- Relevant for resource-limited settings.
- Aligns AI-powered digital health with UN Sustainable Development Goals.

SDG 3 Good Health

SDG 13 Climate Action