

Evaluating AED Access Across Pennsylvania School Districts: Senate Bill 375 Economic and Cost Analysis

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Background

- Sudden cardiac arrest (SCA) occurs when the heart unexpectedly stops with cessation of blood flow to the body and brain. If not immediately treated with cardiopulmonary resuscitation (CPR) and/or an automated external defibrillator (AED), sudden cardiac death (SCD) occurs.
- For every minute without a shock, SCA survival decreases by 10% with overall survival of only 10-12%.
- 20% of the US population can be found in a school on any given school day.
- One in every 70 schools will have a SCA yearly.
- Sudden Cardiac Death (SCD) is responsible for 75% of deaths in young athletes.
- Survival of students in schools with an Automated External Defibrillator (AED) program is up to 89%.
- Only 24 states and the District of Columbia have laws that require AEDs in schools as of 2023, but many are not implemented or funded.
- Pennsylvania (PA) Senate Bill 375 would require each school to have at least one AED in each school building and at all sporting events, a Cardiac Emergency Response Plan (CERP), Cardiopulmonary Resuscitation (CPR)/AED trained personnel, and SCA drills.
- PA Senate Bill 375 was passed unanimously by the Senate Education committee in June and goes to the PA Senate floor for voting in Fall 2023.
- It is recommended that school buildings have one functional AED per 500 students.
- AEDs cost between \$1000-\$2500 but could be less with state bids.
- The enacted PA Basic Education budget for the 2023-2024 fiscal year is \$7,872,444,000

Study Aims

- To determine #AEDs/school for at least one AED/school and #AEDs needed/school by school population.
- Assess AED presence across 6 geographical regions designated by PA Department of Education (DOE).
- Evaluate the AED access by socioeconomic status as determined by median household income among the six regions.
- Determine the overall and individual school cost to provide each PA public school with at least one AED and the total #AEDs needed by student population.

Methods

- We obtained AED data from the Pennsylvania Department of Education Pennsylvania Information Management System (PIMS) 2020-2021 AED Listing for Schools Database which included date of installment for all public schools.
- We obtained School demographic data from the National Center for Education Statistics Public School Characteristics 2021-22 Database.
- We obtained Income data from the American in Community Survey 2021 and listed by ZCTA (Zip Code Tabulation Area).
- We considered AED pricing/unit to be \$1000.
- Pennsylvania is divided into six geographic regions by the Pennsylvania Department of Education.
- We defined functional AED as <8 years old with non-expired electrode pads and batteries.
- Data presented are from 2016-2022 as AEDs installed in the last 6 years were considered functional.** Battery and pad expiration dates are not available in PIMS.
- STATA 17 used for statistical analysis using descriptive statistics and correlations. Data shown as mean(SD).

Results

Table 1: Pennsylvania Public School Population & Demographics

Schools (n)	Student Population (n)	Schools with at least 1 AEDs n (%)		Average Median Household Income (SD)		Schools with sufficient number of AEDs n (%)		Average Median Household Income(SD)		AI/AN (%)	Asian (%)	Blk %	Hisp %	NH PI %	>1 Race %	White %
		Yes	No	Yes	No	Yes	No	Yes	No							
2672	1,502,224	1752 (65.6)	920 (34.4)	\$70,189 (24.7K)	\$73,030 (25.7K)	1652 (61.8)	1020 (38.2)	\$69,487 (24.4K)	\$73,876 (25.8K)	0.16	3.60	12.38	0.08	11.43	4.93	67.39

Table 2: AED Need/School Student Population

Number of AEDs recommended per school population	Number needed to purchase	Estimated AED Cost	
		Overall	Per school
1	854	\$854,000	\$1,000
2	240	\$240,000	\$2,000
≥3	176	\$176,000	≥\$3,000
Total	1,270	1,270,000	\$1,000x

Fig. 2: Number and Percentage by Region of PA Schools with at least one functional AED

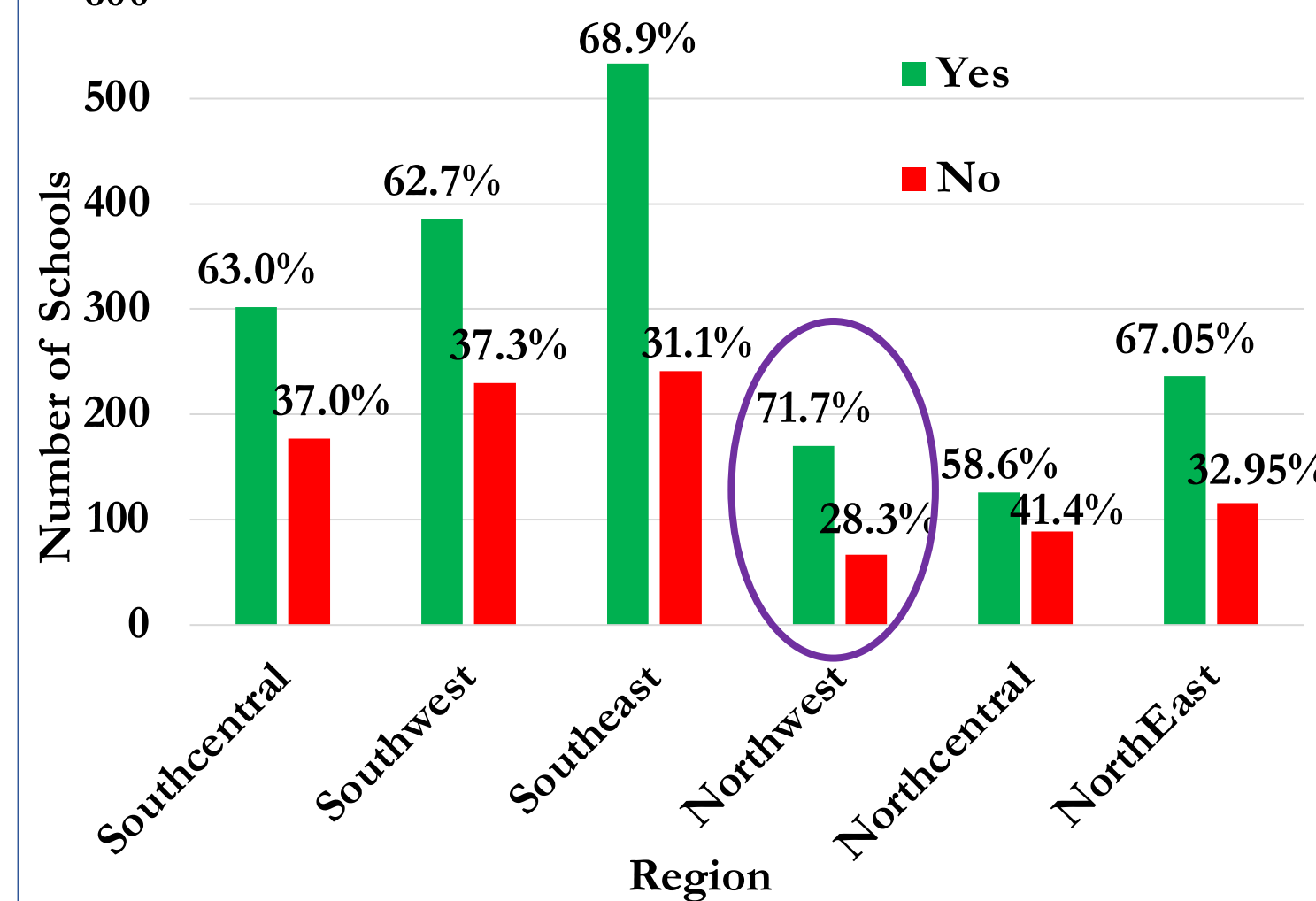
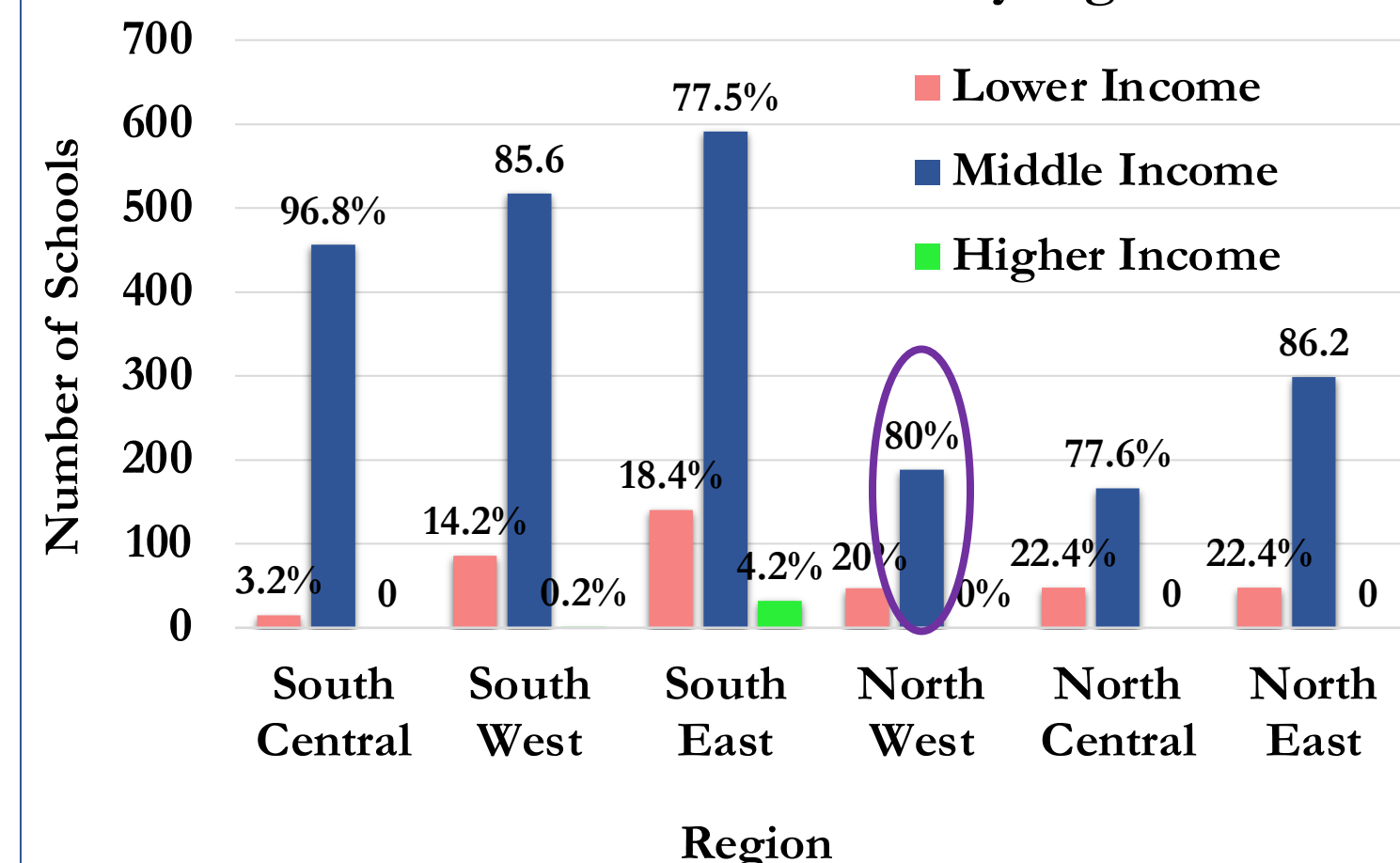


Fig 3. Number of PA schools based on median household income by region



- Overall, 1,752 (65.6%) schools have at least one functioning AED that was purchased on or after Jan 1st, 2016, while 920 (34.4%) schools do not have an AED purchased since that time.
- 1652 schools have sufficient #AEDs for their student population, while 1020 schools do not.
- The mean of the Median Household income for schools with at least one(1) functional AED is \$70,189 and \$73,030 for schools with no functional AED (p = 0.006).

Results

- The Southwest and Southeast regions have the highest number of schools with no AEDs.
- The Northwest region has a highest percentage of AEDs and the second highest percentage of lower income households.
- The North Central region has the highest percentage of schools with no functional AEDs reported (41.4%) and highest % of schools in the lowest income category (22.4%).
- There are significant differences between household income and number of AEDs/school with an inverse proportion, "lower income = more AEDs" (p<0.05).
- The cost estimate to provide 1270 AEDs to PA schools is \$1,270,000 for sufficient AEDs/school.
- This cost is 0.016% of the 2023-24 fiscal year budget for PA.

Conclusions and Discussion

- The cost for the number of AEDs needed is an attainable percentage of the overall State budget.
- The region with the lowest Median Income (SE) ensured AED access in their schools by donations from community and health care groups and prioritization of school budget funds by the Superintendent of Schools.

Recommendations

- AED data collection by the PA DOE should be improved and more comprehensive.
- The state should request battery and electrode pad expiration date data, use age of unit instead of reported condition, and insure tracking of maintenance and replacement of battery/pads.
- Senate Bill 375 should ensure equal access to AEDs by providing funding to all regions.

Limitations

- Data are from 2020-2021 and may not represent current status.
- The expiration date of batteries and pads is not known.
- Our estimate of AED need does not account for spatial factors, vertical space, multiple buildings, etc., which would require more AEDs than recommendations based on population alone.