Impact of Mobile Skin Cancer Screening on Rural Communities and Healthcare Cost

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INTRODUCTION

The Sun Bus (TSB) is a nonprofit mobile dermatology clinic launched in May 2019 *with a mission to reduce the burden of skin diseases, including cancer, through effective screening, education, and research programs*. TSB puts on 40+ annual screening and educational events in 8-12 states in partnership with local volunteer dermatology practices and student volunteers.

This study evaluates the impact of The Sun Bus (TSB) in expanding healthcare access in rural communities, with particular emphasis on the behavioral and economic outcomes of its 2024 skin cancer screening and education initiatives.

The analysis is based on 3 considerations:

- ***Epidemiology:*** Skin cancer is the most commonly diagnosed cancer in the United States, yet the Preventive Services Task Force has not endorsed widespread screening, citing insufficient evidence regarding its population level benefits[1]
- ***Economic burden:*** Between 2016-2018, the annual cost of treating skin cancer in the U.S.was estimated to be $8.9 billion[2].
- ***Rural health disparities*** Rural counties experience significantly higher melanoma mortality rates compared to urban areas largely due to longer travel distances to care and limited access to dermatology specialists[3].

OBJECTIVES

- Assess the impact of a free mobile dermatology screening and educational clinic on rural versus urban communities.
- Observe differences in sun safety habits between rural and urban participants.
- Evaluate the cost effectiveness of The Sun Bus screening/education programs.

METHODS

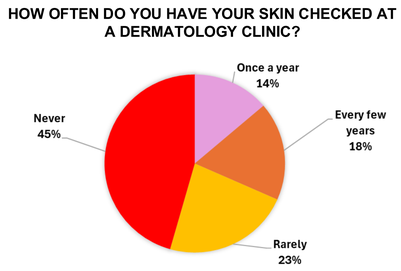
- 1,595 participants screened during the 2024 Sun Bus tour and lesion data was collected using the *ModMed EMR* system.
- Outreach with participants identified with suspicious lesions with phone calls to confirm compliance and accuracy of diagnosis.
- Immediate post-visit and 6 months post-visit anonymous surveys (Qualtrics).
- Differences between rural and urban groups were assessed using Chi-squared (categorical variables) and the Mann-Whitney U test (ordianal variables). * = p < .05.
- Lesion frequency was integrated with direct healthcare costs of melanoma treatment/ stage adjusted to 2023 (Guy *et al.* 2011) to estimate the costs with and without intervention. Indirect costs of skin cancers was based on the Global Burden of Disease Database (2019) that provided disability-adjusted life-years lost/case of skin cancer. Lesion progression without intervention was estimated via informed assumptions.

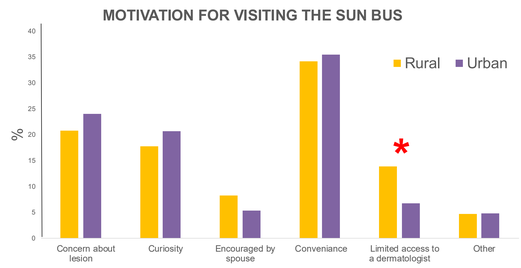
RESULTS

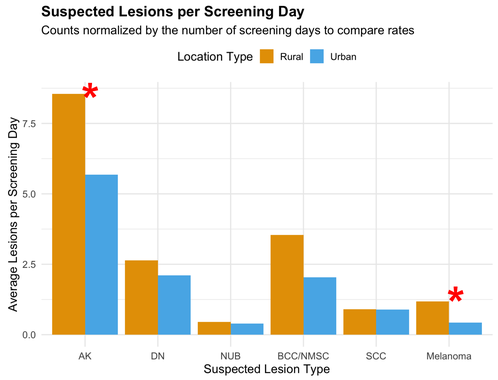
2024 Sun Bus Tour Data

Total # Screenings	Total Suspicious Spots	Actinic Keratosis	Basal Cell Carcinoma	Squamous Cell Carcinoma	Melanoma
1,595	472	253 (53.6%)	96 (20.3%)	35 (7.4%)	25 (5.3%)

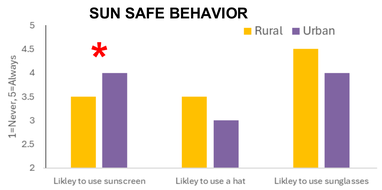
Rural Areas Have Less Access to Dermatology, Less Sun Safe Behavior & More Sun Exposure

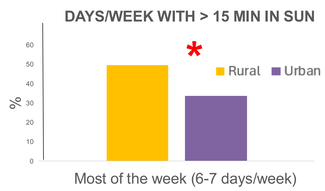






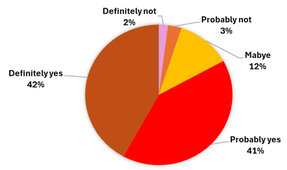
AK: Precancer, DN: Dysplastic/Atypical Nevus, NUB: Neoplasm of uncertain behavior, BCC/NMSC: Basal Cell Carcinoma/Non-melanoma Skin Cancer, SCC: Squamous Cell Carcinoma



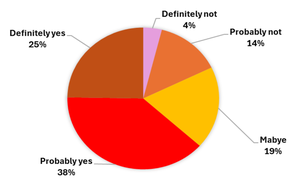


Behavioral & Educational Impact

Do you feel more knowledgeable about sun safety, skin cancer, or skin health after visiting?



Did you increase your sun safe practices after visiting the Sun Bus?



Economic Impact

Frequency of Dermatological Care:		Stage lesion found at with screening:	Lesion progression w/o screening:	Cost savings/case:
14%	Once a year	Stage 0	Stage 1	$4,717.16
18%	Every few years	Stage 0	Stage 2	$18,729.41
22%	Rarely	Stage 0	Stage 3	$34,490.36
45%	Never	Stage 0	Stage 4	$37,968.14

Rural Cost Savings

$58,305	758 Hrs	21,233 Kg
Immediate cost savings amongst 289 rural participants screened	Round-trip time saved for 289 rural participants	CO_2 emissions reduced visiting rural areas
$201.25 cost savings/rural participant. Includes individuals that did not have a nearby dermatologist, fuel costs and the price of a dermatology visit.	157 min/rural participant. Cost savings potentially include work time and cost of childcare/elder care. Travel time calculated for a speed of 70 MPH.	Equivalent of 23,685 lbs of coal burned or 980 propane cylinders used for home barbeques.
Visit estimates used from sidecar health for new patients. AAA Gas price average in 2024. iseecars 2024 study used for MPG.	Estimate does not include appointment time. Includes participants without a nearby dermatology clinic.	400g of CO_2 emitted/mile according to the EPA. Calculation based on mileage saved and does not include follow-up care.

Type of Care	Cost savings at 81% compliance & accuracy 50%
Indirect Melanoma	$387,815
Indirect NMSC	$91,616
Direct Melanoma	$279,410
Skin check ($130)	$207,350
Sun Bus Program Cost	-$230,720
TOTAL SAVINGS	$735,472

CONCLUSION & FUTURE DIRECTIONS

- Significantly **higher proportion of suspected lesions in rural vs urban areas,** in particular melanoma.
- **Rural areas** show **higher burden of sun exposure/less sun safety**.
- The Sun Bus **addresses gaps to dermatology access**
- The Sun Bus screening program demonstrates a **substantial cost savings for the healthcare system.**
- **Significant sun safe behavior change 5 - 6 months after 1 visit** to The Sun Bus.
- **Future studies** will determine the economic impact of early detection of precancers, the economic impact of The Sun Bus's sun safety and skin cancer educational programs, and determining whether AI lesion evaluation may be impactful in rural areas .

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