# Lung disease caused by engineered stone



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Photo credit: Earl Dotter

# **Engineered stone: an emerging threat**





# **Engineered** stone

- Alternative to marble, granite or laminate countertops
- Composite material: crushed quartz (SiO<sub>4</sub>) bound together with polymer resins, pigment, glass, and other additives
- AKA: artificial, agglomerate, quartzite
- Brand names: Silestone, Caesarstone

Stone	Average % Silica	
Engineered stone	≥93	
Quartzite	95	
Quartzitic sandstone	90	
Sandstone	60	
Granite	10 - 45	
Slate	Varies	
Soapstone	Varies	

Sources: Silica Hazards from Engineered Stone Countertops, NIOSH Science Blog, March 2014; ASTM C616, Standard Specification for Quartz-Based Dimension Stone; American Geological Institute, Dictionary of Geological Terms

### Global Emergence of Engineered Stone associated Silicosis



### Silica Hazards from Engineered Stone Countertops

March 11, 2014 by Karen Worthington, MS, RN, COHN-S; Margaret Filios, SM, RN; Mary Jo Reilly, MS; Robert Harrison, MD, MPH; and Kenneth D. Rosenman, MD



A new engineered stone countertop product known as "quartz surfacing," was created in the late 1980s by combining quartz aggregate with resins to create a product for use in home building and home improvement. Manufacturing of this material, including products such as CaesarStone™, Silestone™, Zodiaq™, or Cambria™ is a fast growing industry. First made in Israel and Spain, production of these materials has grown worldwide, driving quartz slab imports to the U.S. up 63% between 2011 and 2012 and 48% between April 2012 and April 2013

(Schwartzkopf 2013, StatWatch 2013). Quartz surfacing materials may contain up to 93% crystalline

### Popular Quartz Countertops Pose a Risk to Workers

#### By BARRY MEIER APRIL 1, 2016



As sleek "engineered stone" countertops grow in popularity, safety experts are warning that workers who handle them are at particularly high risk from an old workplace hazard — silica, the mineral tied to <u>silicosis</u>, a debilitating and potentially deadly lung disease.

The countertops are made from processed quartz, a material containing silica levels as high as 90 percent, or twice the amount found in granite.

#### Morbidity and Mortality Weekly Report (MMWR)

#### MMWR

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#### *Notes from the Field*: Silicosis in a Countertop Fabricator – Texas, 2014

Weekly February 13, 2015 / 64(05);129-130

Gary K. Friedman, MD<sup>1</sup>, Robert Harrison, MD<sup>2</sup>, Heidi Bojes, PhD<sup>3</sup>, Karen Worthington, MS<sup>4</sup>, Margaret Filios, MSc<sup>5</sup> (Author affiliations at end of text)

# Sentinel California Case Identification Timeline

2014



Employed at stone countertop fabrication shop

Diagnosed with silicosis

2013

Worsening symptoms and lung function •

### 2018

January: Ineligible for lung transplant CDPH identifies case

January 2019

 September: Dies of accelerated silicosis







2017



Slide Credit: Amy Heinzerling MD



Morbidity and Mortality Weekly Report (MMWR)

CDC

# Severe Silicosis in Engineered Stone Fabrication Workers — California, Colorado, Texas, and Washington, 2017–2019

Weekly / September 27, 2019 / 68(38);813-818

Cecile Rose, MD<sup>1,2</sup>\*; Amy Heinzerling, MD<sup>3,4</sup>\*; Ketki Patel, MD, PhD<sup>5</sup>; Coralynn Sack, MD<sup>6,7</sup>; Jenna Wolff<sup>1</sup>; Lauren Zell-Baran, MPH<sup>1,8</sup>; David Weissman, MD<sup>9</sup>; Emily Hall, MPH<sup>5</sup>; Robbie Sooriash, MD<sup>5</sup>; Ronda B. McCarthy, MD<sup>10</sup>; Heidi Bojes, PhD<sup>5</sup>; Brian Korotzer, MD<sup>11</sup>; Jennifer Flattery, MPH<sup>3</sup>; Justine Lew Weinberg, MSEHS<sup>3,12</sup>; Joshua Potocko, MD<sup>13</sup>; Kirk D. Jones, MD<sup>14</sup>; Carolyn K. Reeb-Whitaker, MS<sup>15</sup>; Nicholas K. Reul, MD<sup>6,7,16</sup>; Claire R. LaSee, MPH, MSW<sup>15</sup>; Barbara L. Materna, PhD<sup>3</sup>; Ganesh Raghu, MD<sup>6</sup>; Robert Harrison, MD<sup>3</sup> (<u>VIEW AUTHOR AFFILIATIONS</u>)



# **OSHA Silica Standard for Employers**



SHA® Occupational Safety and Health Administration

DSG FS-3682 02/2018



- Determine amount of exposure
  - Action level: 25µg/m3
  - Permissible Exposure Limit: 50µg/m3
- Use dust controls and safer work measures
- Written exposure control plan
- Train workers on health effects
- Offer medical exams
- Keep records of exposures and medical exams



# Worker interviews (n=92)

- •Young (< 40)
- < 4 years at work
- •¼ cutting stone dry
- no silica medical exams

Spiegel et al. *AJIM.* 2022; doi: 10.1002/ajim.23432.

# Public health follow up

Employer screening of 43 employees in California screened with Chest X-ray and PFT



12%

Heinzerling, et al. *AJRCCM*. 2021;203(6):764-6.

# Public health follow up

Screening of 544 employees in Australia screened with CT Chest



22%

Hoy RF, et al. Occup Environ Med 2023;0:1-8.

### JAMA Internal Medicine | Original Investigation

# Silicosis Among Immigrant Engineered Stone (Quartz) Countertop Fabrication Workers in California

Jane C. Fazio, MD; Sheiphali A. Gandhi, MD, MPH; Jennifer Flattery, MPH; Amy Heinzerling, MD, MPH; Nader Kamangar, MD, MS; Nawal Afif, DO; Kristin J. Cummings, MD, MPH; Robert J. Harrison, MD, MPH



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27%	0	No. of time
		Cumulative

Table 3. Health Care Utilization of Patients With Engineered Stone-Associated Silicosis

Health care utilization characteristic (No. with data available)		Overall (n = 52), No. (%)	
Health insurance (52)			
	Uninsured or self-pay	10 (19)	
	Restricted-scope Medi-Cal	20 (38)	
	Full-scope Medi-Cal	7 (13)	
	Private insurance	8 (15)	
	Medicare	0 (0)	
	Workers' compensation	7 (13)	
Location of initial presentation (52)			
	Emergency department	25 (48)	
	Outpatient clinic	19 (37)	
	Medical surveillance	8 (15)	
Emergency department (52)			
	Ever visited emergency department (52)	42 (82)	
	No. of emergency department visits (42), median (IQR)	2.50 (1.00-4)	
Hospitalization (51)			
	Ever hospitalized for breathing	31 (61)	
	No. of times hospitalized (31), median (IQR)	2.0 (1-3.5)	
	Cumulative hospital length of stay per patient (30), median (IQR), d	9.5 (4.3-19.8)	

## Undocumented Uninsured Unprotected



#### Years of work in engineered stone industry (51), 15 (10-20) median (IQR) Continued working after diagnosis (52) Still working 25 (48) Not working 18 (35) 9(18) Unknown Engineering controls: water suppression methods (51) 23 (45) Respirator use (47) Sometimes 35 (74) 12 (26) Always Type of respirator (37) N-95 33 (89) Half-face respirator 17 (46) Full-face respirator 2 (5) No. of employees in workshop (35) <10 17 (49) 10-50 17 (49) >50 1(2)

**Occupational history** 

Source: Fazio JC et al. Epidemic of silicosis among immigrant engineered stone (quartz) countertop fabrication workers in California. JAMA IM, July 24, 2023

# Present with advanced disease



15% fatal and counting....

Source: Fazio JC et al. Epidemic of silicosis among immigrant engineered stone (quartz) countertop fabrication workers in California. JAMA IM, July 24, 2023



## CHEST

### **Original Research**

OCCUPATIONAL AND ENVIRONMENTAL LUNG DISEASES

### **Artificial Stone Silicosis**

### **Disease Resurgence Among Artificial Stone Workers**

Mordechai R. Kramer, MD, FCCP; Paul D. Blanc, MD, MSPH, FCCP; Elizabeth Fireman, PhD; Anat Amital, MD, FCCP; Alexander Guber, MD, FCCP; Nador Abdul Bhahman, MD; and David Shitrit, MD



 $\ensuremath{\mathsf{Figure}}$  1. Reported cases of silicosis due to engineered stone among lung transplant candidates in Israel.

### Kramer et al 2012

### Figure 1. Yearly Case Counts for 52 Patients With Engineered Stone-Associated Silicosis in California, 2010-2022



Fazio et al 2023

### California Fast-Tracks Rules to Protect **Stonecutters From 'Horrible' Deaths**



By Farida Jhabvala Romero 🤍 🛛 Jul 22 📮 Save Article

NEWS



Leobardo Segura-Meza, 27, speaks to California workplace regulators via video on July 20, 2023, while his wife Mirian looks on, Segura-Meza, who requires an oxygen tank at all times to breathe, was diagnosed last year with silicosis after working for 10 years cutting engineered stone countertops. (From Cal/OSHA meeting screenshot )

- Trigger tasks
- Wet methods
- **Regulated** areas
- PAPRs

### Los Angeles Times

# California embraces emergency rules to protect countertop workers from incurable silicosis



Stone countertop fabricators at work in Sun Valley this fall. (Brian van der Brug / Los Angeles Times)

BY EMILY ALPERT REYES | STAFF WRITER DEC. 14, 2023 UPDATED 3:55 PM PT

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Community, employer & worker outreach

### **Registration & enforcement**

**Education and assistance** 

**Medical testing** 

**Case reporting** 



### Australia makes world-first decision to ban engineered stone following surge in silicosis cases

By the Specialist Reporting Team's Leonie Thorne and national consumer affairs reporter Michael Atkin Posted Tue 12 Dec 2023 at 11:20pm, updated Wed 13 Dec 2023 at 3:33am



Engineered stone has become a popular product in kitchens for its affordability and durability. (Unsplash: Christian Mackie)



# **Ч**ге-јои



# Silicosis: a serious issue

Today, there is a growing policy focus on restricting the trade of products with high crystalline silica content.

The market demands a new industrial raw material free from crystalline silica while maintaining the same features of natural guartz aggregates.







Choose Your Colour  $\vee$ 

Inspiration & Resources  $\vee$ 

See & Buy  $\sim$ 

Support  $\sim$ 

Why Caesar

The health and safety of our employees, suppliers, partners and communities are our first priority



### Pioneering the Caesarstone Mineral<sup>™</sup> Crystalline Silica-Free revolution

Introducing the next generation surfaces – premium, sustainable designs formulated with a unique blend of materials.

View The XRD Test Results  $\rightarrow$ 



# What is the difference between Caesarstone Mineral<sup>™</sup> crystalline silica-free and the recently banned engineered stone?

Both of these products are manufactured in the same way, the major difference being in the raw material, engineered stone is classified as an artificial product that: a) is created by combining and heat curing natural stone materials that contain crystalline silica (such as quartz or stone aggregate) with chemical constituents (such as water, resins or pigments). Our Caesarstone Mineral<sup>™</sup> material blend is made from recycled glass, polymer resins and pigment.

#### Got It 🧹

### What is the Caesarstone Mineral<sup>™</sup> Crystalline Silica-Free Collection?

The collection is a curated range of our most loved designs, which will be transitioning to a crystalline silica-free material blend in line with the new government regulations.

View the designs transitioning throughout 2024.



Scan below to check the latest availability of designs in the crystalline silica-free material blend.



# Safer alternatives to engineered stone containing RCS in California

- Consumer demand
- Regulatory compliance
- Medical and public health impact

