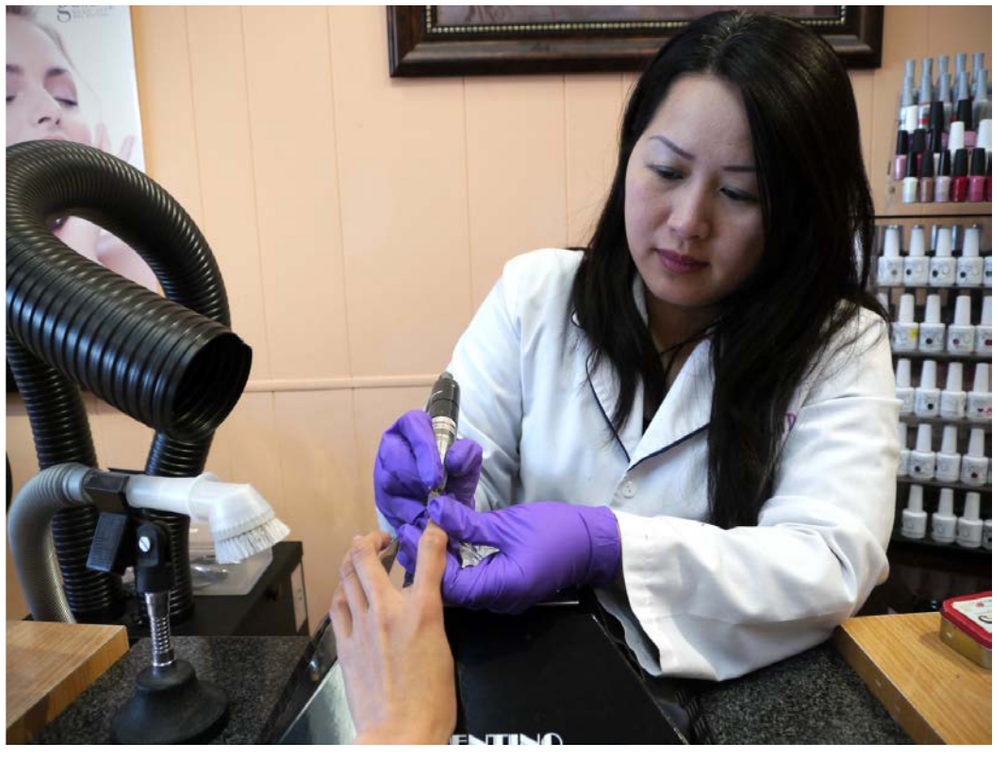
Chemical Exposures from Cosmetics: A Case Study of Nail Care Products



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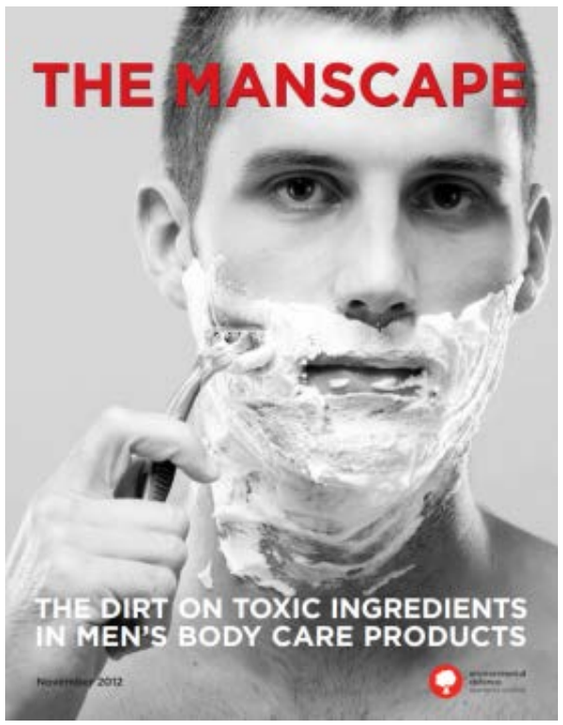
Research Director, Asian Health Services
California Biomonitoring Scientific Guidance Panel Meeting
July 10, 2014

Cosmetic widespread long-term use

- Women use an average of fifteen cosmetic products per day;
- Cosmetic use among men has been increasing dramatically.



Cosmetics Regulation

- Cosmetics fall under U.S. Food and Drug Administration (FDA), but FDA does **NOT** have legal authority to require:
  - ✓Pre-market testing of products by manufacturers
  - ✓Necessary information from industry for FDA to conduct its own pre-market testing
  - ✓Require that products sold for professional use include ingredients labels
- Industry has no incentive to conduct toxicity testing of their products for long-term effects such as cancer

California Safe Cosmetics Act

Reporting requirements apply to cosmetic companies if:

- The company makes $1 million or more annually in worldwide aggregate cosmetic sales;
- The company name is on the label of a cosmetic product sold in California after January 1, 2007;
- The product contains an ingredient identified as a known or suspected human carcinogen or reproductive toxicant.

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California Safe Cosmetics Program Product Database

red lipstick

What is the California Safe Cosmetics Program Public Database?

The California Safe Cosmetics Act (the Act) requires companies that manufacture cosmetics to report any cosmetics products that contain ingredients known or suspected to cause cancer, birth defects, or other reproductive harm. The California Safe Cosmetics Program (CSCP) collects this data and makes it available to the public through this website.

Are you curious to see what ingredients have been reported for your shampoo? Want to compare the ingredients of different sunscreens? You can search the database for a type of product; a specific product name; or a brand or company name.

You can also read more about chemical ingredients, learn about how chemical exposure can affect your health, test your knowledge of cosmetics, or learn more about the California Safe Cosmetics Program by clicking on links to the right.

More information on the California Safe Cosmetics Act and cosmetics in the news is also available

What is in my cosmetics?
See a list of reported chemicals.

How can exposure to toxic chemicals affect my health?

What do these search results mean - and other FAQs.

For cosmetic companies:

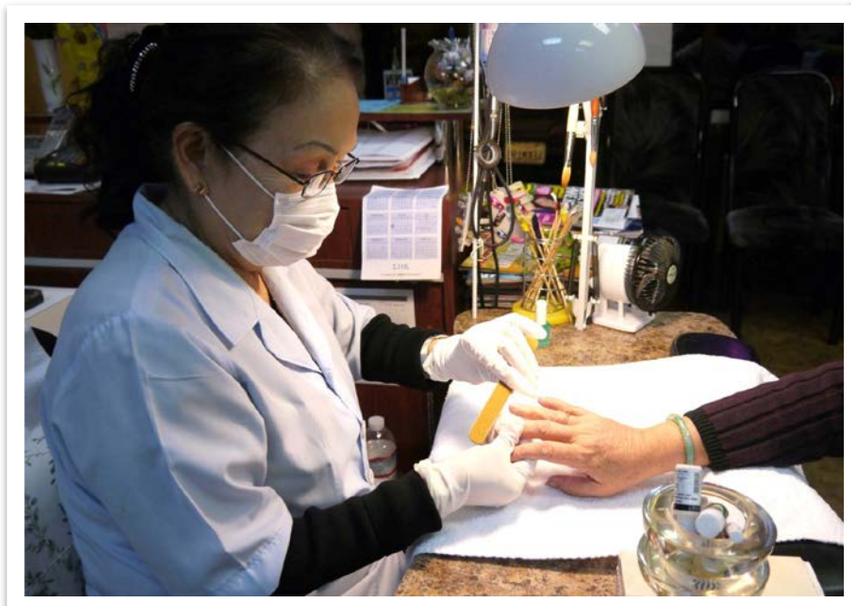
Report products through the CSCP Online Reporting System

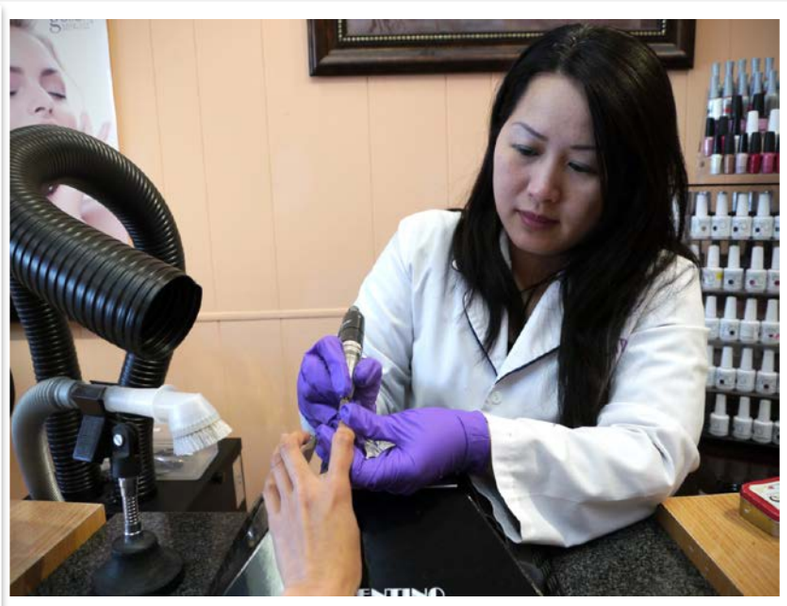
http://www.safecosmeticsact.org/search/

Why the Interest in Nail Salon Workers

Nail Salon Workforce

- Rapid growth due to tripling of nail salons in last two decades
  - California workforce comprised over 100,000 licensed manicurists
- Vietnamese comprise ~60-80% of workforce in California
- 95% female workers





Growth of cosmetologists and manicurists in California

Figure 1. Number of Actively Licensed Cosmetologists By Year (1970-2005)

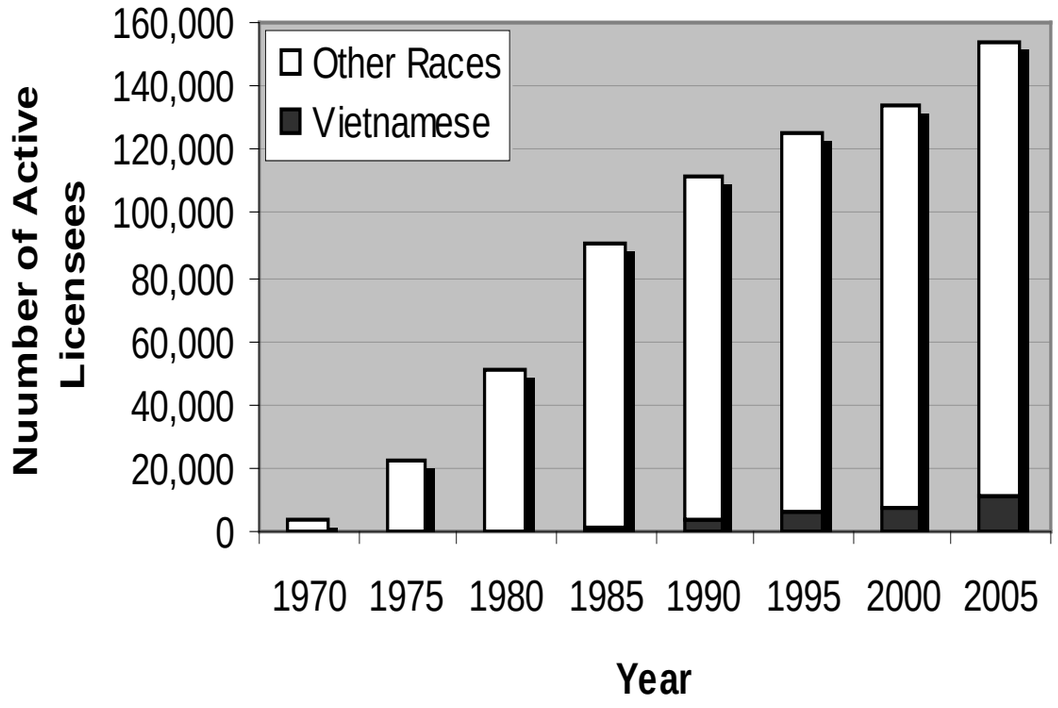
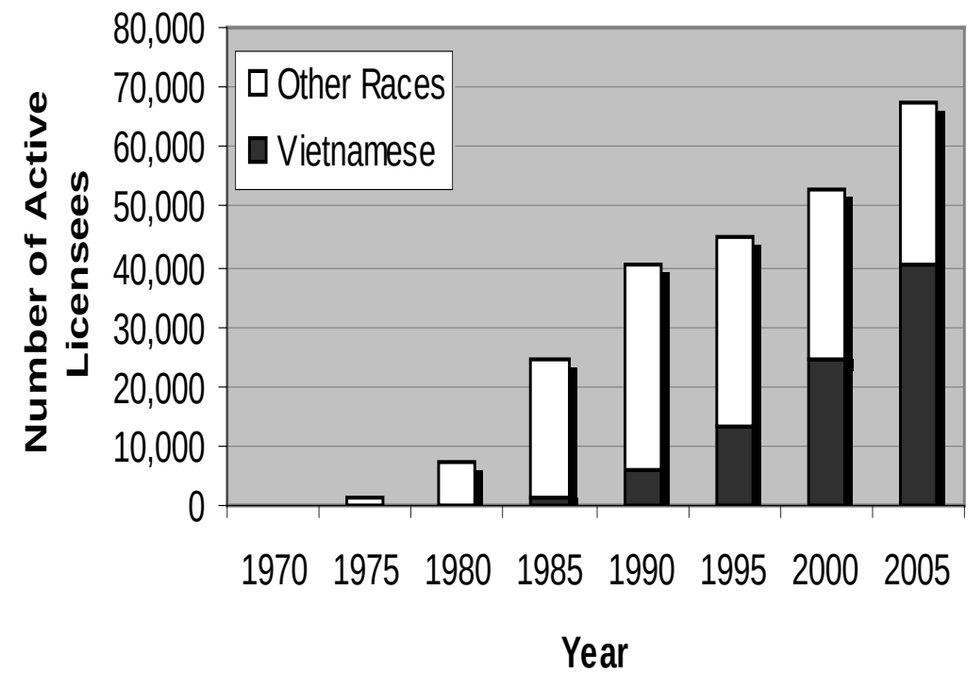


Figure 2. Number of Actively Licensed Manicurists By Year (1970-2005)



Source of data: California Board of Barbering and Cosmetology Licensee file of cosmetologists and manicurists from 1970-2005

Workforce Context and Complexities

- **Employee vs. Independent contractor**
  - Lack employee benefits – health care
  - Owners are also workers
- **Workplace hazards**
  - Exposures to multiple chemicals over long periods of time
  - Small poorly ventilated salons
  - Limited or lack of product labeling
- **Immigrant workers in Nail Salons**
  - Language barriers
  - Cultural factors

Select Compounds in Nail Products

Compounds	Nail care use	Potential Health Effects	Route(s) of Exposure
Acetone	Nail polish remover	Shortens menstrual cycle	Inhalation, dermal
Dibutyl Phthalate (DBP)*	Nail polish	Endocrine disruption; developmental and reproductive effects	Inhalation, dermal
Formaldehyde	Nail hardener, disinfectant	Known carcinogen; respiratory effects	Inhalation, dermal
Methylene Chloride*	Artificial nail solvent	Possible carcinogen	Inhalation, dermal
Methyl Ethyl Ketone (MEK)	Nail polish thinners	Damaged liver and kidney, reproductive effects	Inhalation, dermal
Methyl Methacrylate (MMA)	Artificial nails	Respiratory effects - asthma; neurological symptoms	Inhalation, ingestion
Titanium Dioxide	Acrylic nail powder, nail polish	Possible carcinogen	Inhalation
Toluene*	Nail polish, nail polish thinner, nail adhesives	Developmental toxicant; endocrine disruption	Inhalation, dermal

*relevant to biomonitoring

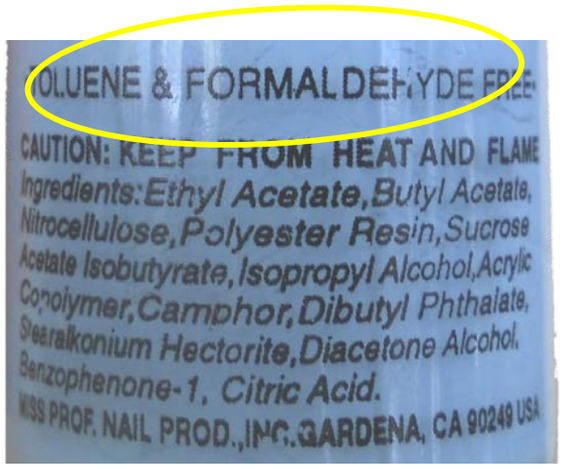
Toxic Trio: chemicals of concern

These three compounds referred to as "toxic trio" in nail polishes

1) **Dibutyl Phthalate**
   Use: provide flexibility
   Health impacts: endocrine disruptor; reproductive effects; cross placenta and affect fetal development

2) **Formaldehyde**
   Use: nail-hardening agent; tool disinfectant; hair straightening products
   Health impacts: known carcinogen (nasopharyngeal and leukemia)

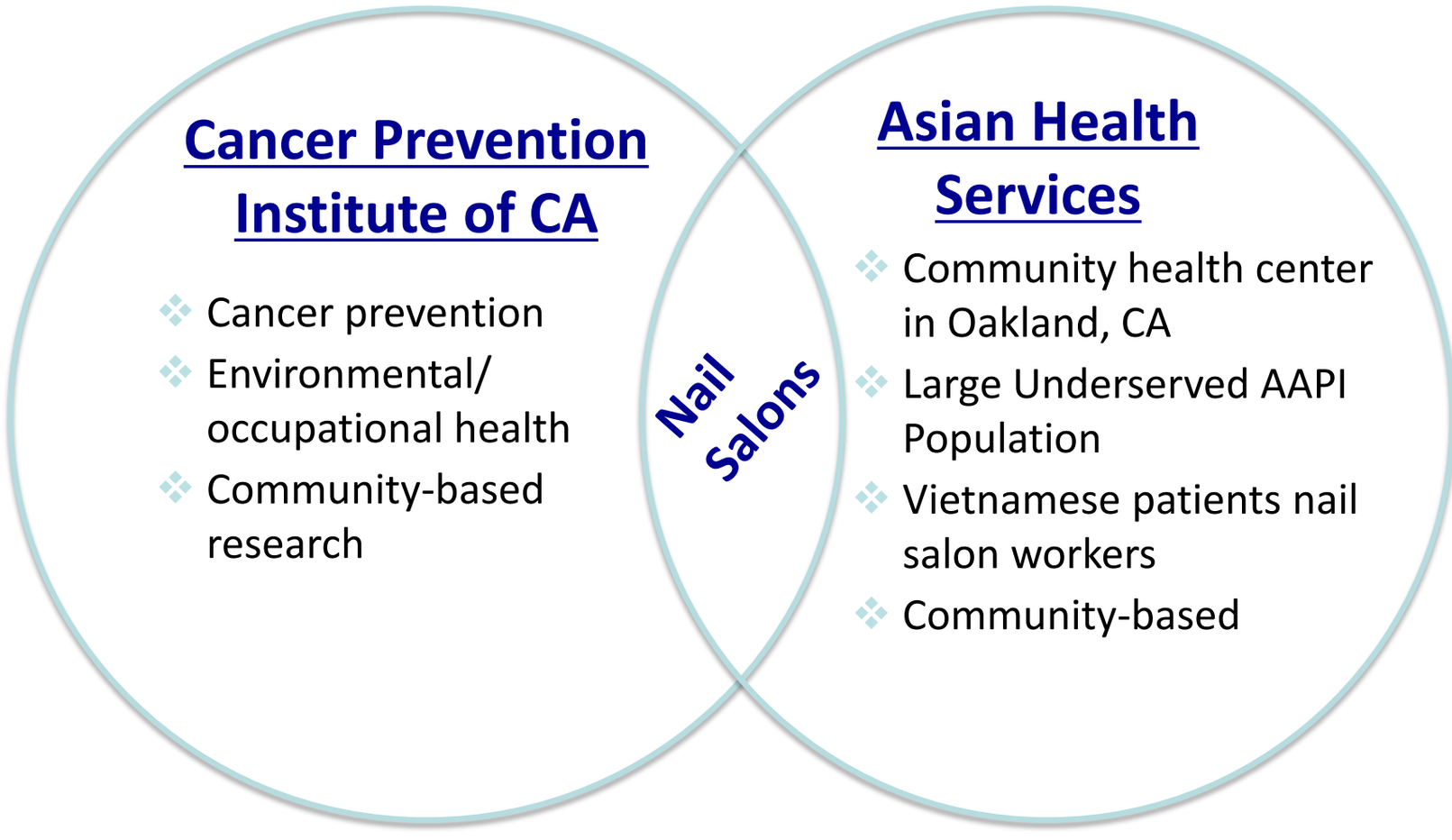
3) **Toluene**
   Use: creates a smooth finish & keeps pigment from separating in bottle
   Health impacts: endocrine disruptor; reproductive & developmental effects



Past Research Studies

Descriptive Survey of Vietnamese Nail Salon Workers

- Health and safety of nail salon issues emerged from community
- Mutual interest between community and research partner
- Funded by California Breast Cancer Research Program for community-research collaboration (2005-2007)



Study Methods and Findings

Research methods

1)Two focus groups (N=20 workers and owners)

2) In-person surveys in salons (N=201 workers from 74 salons)*

**conducted by former and current nail salon workers*

Major findings

- Half the salons had poor methods for ventilation
- 80% of workers reported health concerns due to work
- Nearly 50% of workers reported acute health symptoms (headaches, dizziness, difficulty breathing, skin irritations)

***Quach T**, Nguyen KD, Doan-Billings PA, Okahara L, Fan C, Reynolds P. A preliminary survey of Vietnamese nail salon workers in Alameda County, California. J Community Health, Oct;33(5):336-43, 2008*

Follow-up Study: Cancer

Record-linkage study to examine cancer rates in workforce

CA licensee file

Workforce cancer rates

CA cancer registry file

RESULTS: No excess cancer risk found for any sites

CONSIDERATIONS: Workforce is still fairly young and short observation time; may require extending years of study

Quach T, *Doan-Billing PA, Layefsky M, Nelson D, Nguyen KD, Okahara L, Tran AN, Von Behren J, Reynolds P. Cancer Incidence in Female Cosmetologists and Manicurists in California, 1988-2005. Am J Epidemiol. 2010 Sep 15;172(6):691-9.*

Follow-up Study: Air Monitoring

Conducted air monitoring with 80 workers from 20 salons during their work-shift

Personal monitoring

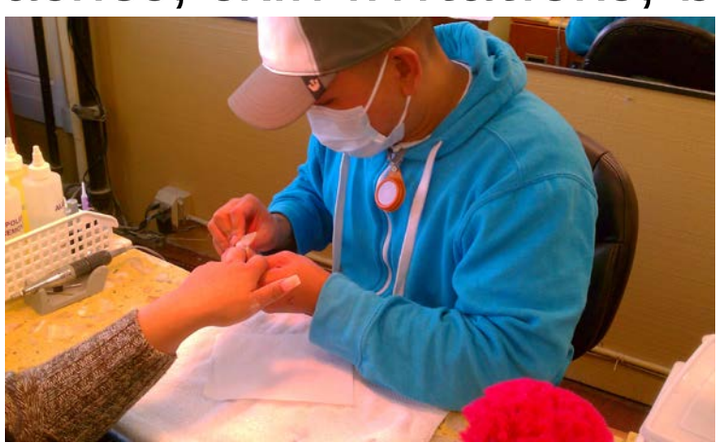
- Toluene levels 2x higher than recommended indoor air

Area monitoring

- Detected methyl methacrylate (100% MMA monomer banned from nail products)
- Total volatile organic compounds (TVOC) - higher levels than recommended indoor air

Acute Health Problems

- Measured levels may explain why workers (>25%) reporting uncomfortable health symptoms (headaches, skin irritations, breathing problems).



Quach T et al. Characterizing Workplace Exposures in Vietnamese Women Working in California Nail Salons. Am J Public Health. 2011 Dec;101 Suppl 1:S271-6. Epub 2011 May 6.

Ongoing research studies

Intervention Study

Keeping a
Healthy
Occupational
Environment &
Developing
Empowerment
Program

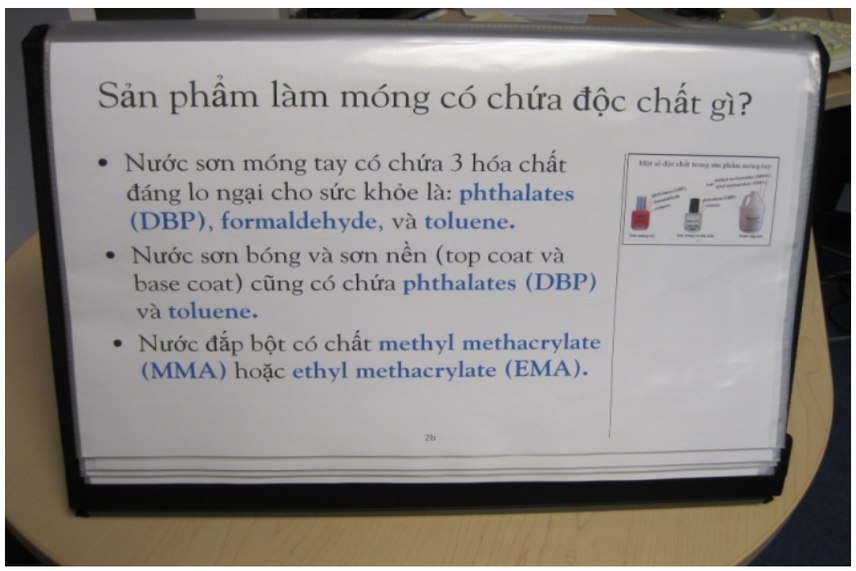
NIEHS 2R01ES019598

Randomized Controlled Trial

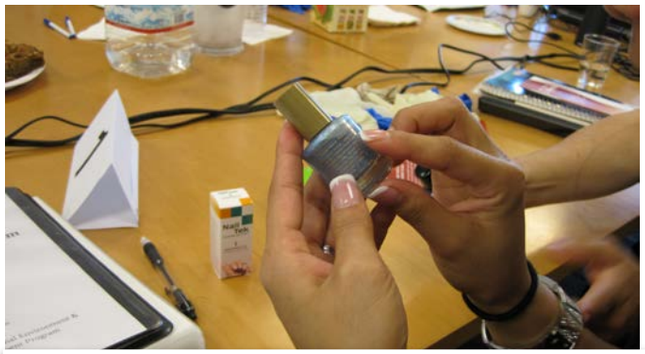
- Goal: Evaluate the effectiveness of a train-the-trainer intervention
  - ✓salon owners are trained around best practices to reduce chemical exposures and then train their workers

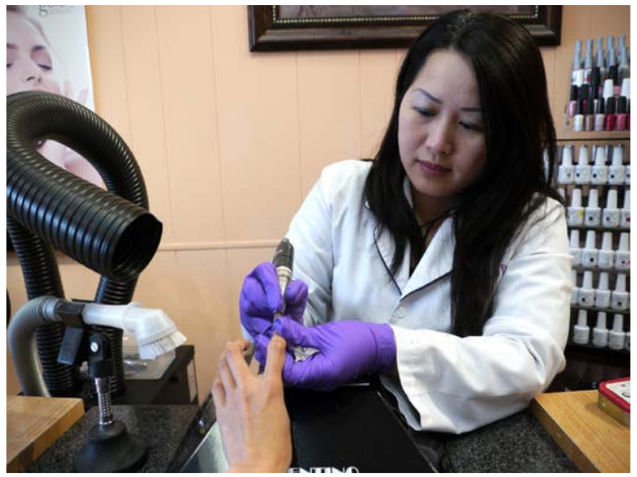
- Conduct personal air monitoring (toluene, methyl methacrylate, methyl ethyl ketone, & TVOCs) and surveys

- Regions: 1) Marin/Contra Costa, 2) Alameda, 3) Santa Clara, and 4) Orange County/Los Angeles



5 Ways To Reduce Your Chemical Exposure





Use less toxic products

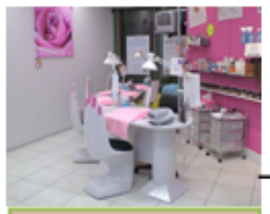
Ventilate nail stations

Protect face and hands

Handle and store chemicals properly

Practice healthy work habits

Study Design



Nail salons
(N=90)

RANDOMIZE

Intervention
Group
(N=45 salons)

Comparison
Group
(N=45 salons)

T1*

T2*

T3*

Owner training

Worker training

Complete

Full Intervention

Owner training

Worker training

Delayed Full Intervention

*T1, T2, T3 = Assessments include survey & personal air monitoring

Research Gaps and Emerging Products

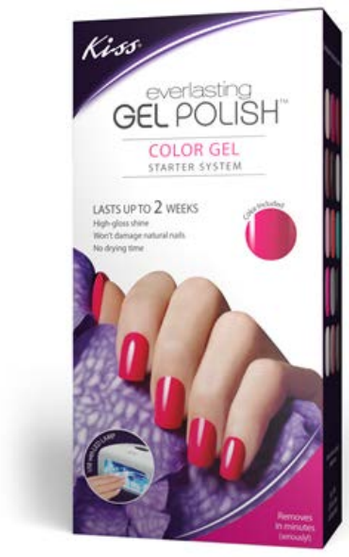
Research Gaps

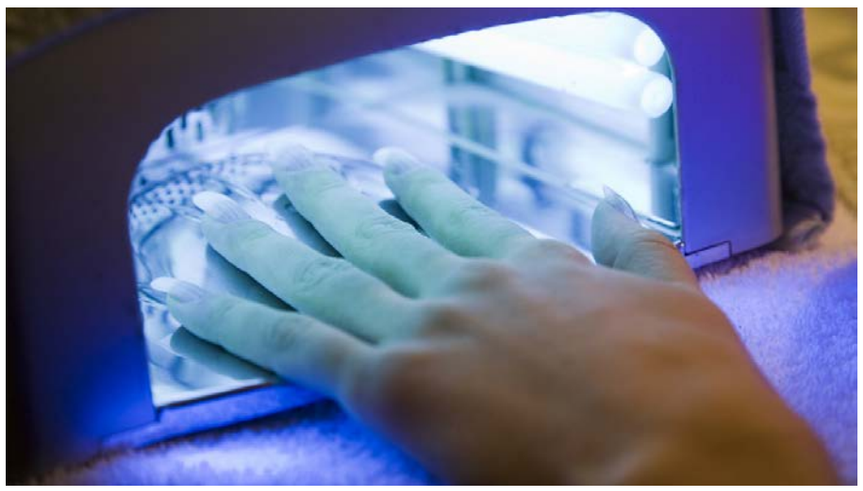
- Better exposure assessment
  - ✓Going beyond single chemical to multiple chemicals; looking at synergistic effects and potential predispositions
  - ✓Tying exposure to sources (i.e., products and their usage)
  - ✓Biomonitoring that provides more insights into exposure
- Need for longitudinal study on respiratory, reproductive, cancer and other health outcomes
  - ✓Cross-sectional may have selection bias; long latency periods; and lack of reliable and relevant health surveillance
- Better research around health literacy and effective health communication for immigrant workforces
  - ✓Powerful stakeholder – links to manufacturers as well as consumers

Emerging Products and Trends

Industry is constantly changing, with new trends and products marketed to consumers and workforce

- False sense of safety with little research
  - ✓Gel polishes
- Regrettable substitutes
  - ✓Triphenyl phosphate (TPP) as substitute for dibutyl phthalates (DBP)





Research Challenges

Intense amount of work when working with immigrant population in small business sector

- Language barriers
- Cultural issues (e.g., choose livelihood over health)
- Risks posed to livelihood
  - ✓small profit margin and reliance on customers decision-making
- Owner-worker dynamics
- High turn-over of workers and salon businesses
- Distrust and fear of government due to historical experiences in Vietnam and interactions with inspectors
- Low health literacy, especially in chemicals

Research Opportunities

- Raising awareness on chemical exposures can be empowering for workforce
- Biomonitoring would provide information (e.g. phthalates exposure) connecting to “body burden”
  - ✓Potential to identify occupational sources
- Effective health communication of results to drive multi-level change
  - ✓Influence individual and salon level changes
  - ✓Influences workers, owners and consumers to buy safer alternatives/ affect industry
  - ✓Influence policy-makers to change regulations