Includes peer-reviewed articles and articles that were sponsored or funded by a university or government agency. Starred articles are the most comprehensive.

**Garey KW, Johle ML, Behrman K, and Neuhauser MM. 2004. “Economic consequences of unused medications in Houston, Texas.” *Ann Pharmacother* 38:1165-1168.**

This study evaluated pharmaceuticals returned to a pharmacy in Houston, Texas. The researchers collected 1,315 pharmaceutical containers over the 6-month period. Of the pharmaceuticals evaluated, 65% were prescription pharmaceuticals, 27% were over-the-counter, and 8% were sample products. Oral medication was the most frequently returned type of pharmaceutical (64%) but liquids, inhalers, and miscellaneous medical equipment products were also collected.

**Kaye, Lenard, Jennifer Crittenden, and Stevan Gressit. 2010. “Safe Medicine Disposal for ME A Handbook and Summary Report.” *Center on Aging; The University of Maine*. Available at:** [**http://umaine.edu/safemeddisposal/files/2014/01/MailbackReportCondensedFile.pdf**](http://umaine.edu/safemeddisposal/files/2014/01/MailbackReportCondensedFile.pdf)

This report summarizes sampled data from the first statewide unused medicine mail-back program in the country. During the program, 9,400 envelopes were distributed and 3,926 envelopes were collected. Of the collected pharmaceuticals, 2,123 pounds of non-controlled pharmaceuticals were destroyed and 250 pounds of controlled pharmaceuticals were destroyed. Only occasionally were drugs returned without their original container.

**\*Kreisberg, Joel, Ilene Ruhoy, and Connie Zheng. 2010. “Bay Area Medication Disposal Study 2009: An Inventory of Household Pharmaceutical Waste.” Teleosis Institute, Berkeley, CA. Available at:** [**http://teleosis.org/wp-content/uploads/2017/10/BA-Medication-Disposal-Report-2009.pdf**](http://teleosis.org/wp-content/uploads/2017/10/BA-Medication-Disposal-Report-2009.pdf)**’**

This study evaluated the quantity and types of unused pharmaceuticals returned in the San Francisco Bay Area. In 2009, 126 take-back sites collected 60,365 pounds of unused pharmaceuticals. Researchers manually inventoried returned pharmaceuticals by hand from 3 of the take-back sites. Out of the pharmaceuticals returned, 64.6% of the medications were prescription, 25.4% were over-the-counter, and 10% were nutritional supplements. Pharmaceuticals are commonly returned in packaging, which includes both plastics and paper. Out of the pharmaceuticals returned, the average percent packaging by volume was 52.2%. As part of the inventory process, one of the samples from Palo Alto was separated into pharmaceuticals and packaging and weighed. By weight, 85.6% was pharmacological ingredients and 15.4% was packaging (13.3% plastic and 2.1% paper). Of the 8,982 items identified by researches, 166 were inhalers, 8 were lancets, and 4 were contact lens cases.

**\*Kreisberg, Joel. 2013. “San Francisco Medicine Waste Characterization Study.” Teleosis Institute, Berkeley, CA. Available at:** [**https://sfenvironment.org/sites/default/files/fliers/files/sfe\_th\_sf\_medicine\_waste\_characterization\_study.pdf**](https://sfenvironment.org/sites/default/files/fliers/files/sfe_th_sf_medicine_waste_characterization_study.pdf)

This study evaluated pharmaceuticals returned to 23 take-back sites throughout the City and County of San Francisco. A representative sample was aggregated from all 23 take-back sites and then manually inventoried under the supervision of local law enforcement. The sample consisted of one week’s worth of medicine collected at each of the 13 pharmacy take-back locations and one month’s worth of medicine collected at each of the 10 San Francisco police station take-back locations. The researchers inventoried 472 pounds of returned pharmaceuticals. The sample included 79.6 pounds of packaging (16.8% packaging by weight­). The inventories sample included 3,193 different items (generally an “item” was a container of medication in its original bottle). 3,028 items were identified as pharmaceutical products. Of the 3,028 items identified as pharmaceuticals, 96 were injectables, 54 were aerosols, and 18 were inhalers. Out of the pharmaceuticals returned, 71.9% were prescription, 23.2% were over-the-counter, and 4.9% were nutritional supplements.

**Ma, Carolyn S, Forrest Batz, Deborah Taira Juarez, and Lani Ladao. 2014. “Drug Take Back in Hawai‘i: Partnership Between the University of Hawai‘i Hilo College of Pharmacy and the Narcotics Enforcement Division.” Hawaii Journal of Medicine and Public Health. 73(1): 26-31. Available at:** [**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3901169/**](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3901169/)

This study examined 8,011 pounds of pharmaceuticals returned at eleven take-back events in Honolulu, O’ahu, Maui, Kaua’I, and Hawai’I Island. Returned pharmaceuticals included prescription (controlled and uncontrolled) and over-the-counter pharmaceuticals. Aspirin and ibuprofen were the most common over-the-counter pharmaceuticals returned. The researchers inventoried over 42,000 over-the-counter pills that were collected during the take-back events. The majority of returned pharmaceuticals were tablets and capsules. Few intravenous, patches, creams, and lotions were returned.

**Perry, Laura, Bradley W. Shinn, and John Stanovich. 2014. “Quantification of ongoing community-based medication take-back program.” *Journal of American Pharmacy Association.* 54:275-279.**

This study evaluated the pharmaceuticals returned at seven take-back days in order to quantify the pharmaceutical waste. The researchers classified the pharmaceuticals by drug name, dose, quantity, type, and estimated cost. The article reports the most commonly returned prescription pharmaceuticals but points out that the researchers received over-the-counter drugs in addition to prescription drugs.

**Stewart, H, Malinowski, Ochs, Jaramillo, McCall, and Sullivan. 2015. “Inside Maine’s Medicine Cabinet: Findings from the Drug Enforcement Administration’s Medication Take-Back Events. *American Journal of Public Health.* 105(1):65-71.**

This study examined data from six Drug Enforcement Administration take-back events across 11 Maine cities from 2011 to 2013. During the events, 1,049 participants returned 13,599 products that were then inventoried by unit (i.e., capsule, tablet, patch, etc.) and classified by medication classification. Of the inventoried pharmaceuticals, 65.5% were prescription (controlled and non-controlled) and 31.4% were over-the-counter.

**Welham, Grace C., Jeanine K. Mount, and Aaron M. Gilson. 2015. “Type and Frequency of Opioid Pain Medications Returned for Disposal.” *Drugs – Real World Outcomes*. 2:129-135.**

This study evaluated pharmaceuticals returned at a take-back event in Dane County, WI. At the take-back event, 761 households returned over 1500 pounds (680 kg) of pharmaceuticals. The goal of the study was to characterize the type and frequency of opioid pain medications returned. Controlled substances comprised 160 pounds (10.7 %) of the total 1,500 pounds of returned pharmaceuticals. The study points out that the researchers removed packaging and attempted to weigh the medications with as little packaging as possible.

**Yang, Christina H.J., Mitesh Doshi, and Nancy A. Mason. 2015. “Analysis of Medications Returned During a Medication Take-Back Event.” *Pharmacy* 3, 79-88.**

This study evaluated the pharmaceuticals returned at a take-back event in Lansing, MI for four hours in September 2013. The event gathered 3,633 containers which included over-the-counter and prescription pharmaceuticals. The study analyzed 2,459 containers which included 304 controlled substances. The study only reported the top 15 most commonly returned pharmaceuticals. This list included ibuprofen and aspirin.

**2009. “Disposal of Unwanted Medicines: A Resource for Action in Your Community.” *Illinois-Indiana Sea Grant Program/University of Illinois Extension*. Available at:** [**https://web.extension.illinois.edu/unusedmeds/disposal/Unwanted\_Meds\_Toolkit\_April\_2011.pdf**](https://web.extension.illinois.edu/unusedmeds/disposal/Unwanted_Meds_Toolkit_April_2011.pdf)

This report summarizes the outcomes from various take-back events across the U.S. but does not outline the methodology for identification and classification of pharmaceuticals collected at the take-back events. The city of Green Bay, Wisconsin sponsored two take-back events in 2008 that brought in over 2,100 pounds of pharmaceuticals. The collected materials included 1,700 pounds of pills, 470 pounds of liquid medication, 31 pounds of aerosols and inhalers, six mercury thermometers, and several pounds of miscellaneous items. In 2006, Monroe County, Indiana sponsored a take-back events and collected 356 pounds of pharmaceutical waste, 272 containers of controlled substances, and 166.7 pounds of sharps.