



Leftover Medicine Disposal in the Great Lakes Basin Counties of Wisconsin, Survey Report, 2011

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Executive Summary

The purpose of this study was to gather information about the practices and opinions with respect to the disposal of leftover medicines in the Wisconsin counties within the Great Lakes basin.

In April, 2011, the Survey Research Center (SRC) at the University of Wisconsin – River Falls mailed surveys to a random sample of 1,536 households in the 36 Wisconsin counties that are partially or totally within the Lake Michigan or Lake Superior basins. The surveys were followed by post card reminders and a second mailing to non-respondents. The overall response rate was 25 percent (383 completed questionnaires). The results provided in this report are expected to be accurate to within plus or minus 5.0 percent with 95 percent confidence. There is little evidence that non-response bias is a concern for this sample.

The first set of questions asked for respondents' opinions about a range of issues associated with disposal of unused medicines. Majorities of respondents agreed or strongly agreed that traces of leftover medicines have been found in streams/lakes and in drinking water. They also agreed that leftover medicines are a common path to drug abuse and overdose. Large majorities of respondents disagreed or strongly disagreed that leftover medicines should be disposed in the garbage or by flushing them down the drain or toilet. Two-thirds of respondents disagreed or strongly disagreed that leftover medicines will harmlessly decompose in the environment and that municipal water treatment facilities remove leftover medicines. Respondents had split opinions about the known health impacts of leftover medicines on humans and aquatic life and whether storing leftover medicines at home poses a health risk.

When asked to identify their past and current disposal practices, respondents reported they have made significant changes in the way they dispose of their leftover medicines. They are substantially less likely to place leftover medicines in the trash in an unaltered form or to flush/pour the leftover medicines down the toilet or sink. In addition they are more than two times as likely to participate in a leftover medicine collection program.

Convenience and the recommendation of a pharmacist or doctor are more important factors influencing how respondents dispose of unused medicines than is information from the internet or newspapers and magazines.

Between two-thirds and three-fourths of respondents said they do not know if the following disposal programs are available in their communities: ongoing mail-back with postage paid mailers, return to pharmacy where purchased, ongoing drop-off receptacle. About half of the respondents were unaware of single-day, drop off collection events in their communities.

The primary impediments to participation in disposal programs are lack of awareness about the existence of a take-back program and not having any leftover medicines to dispose of.

When asked for their preferences about disposal programs, four in five respondents said they would be likely or very likely to use an ongoing drop-off receptacle or to return their leftover medicines to their pharmacy. A smaller majority (60%) said they would participate in an ongoing mail-back program or a single day drop-off collection event.

If a free mail-back program were available, respondents prefer that the envelopes be available at their pharmacy rather than at a big-box store, local government office, or community center.

Survey Purpose

The purpose of this study was to gather information about the practices and opinions with respect to the disposal of leftover medicines in the Wisconsin counties that are partially or totally within the Great Lakes basin and was part of a research project by Steven Brachman of the UW-Extension Solid and Hazardous Waste Education Center (SHWEC).

Survey Methods

In April, 2011, the Survey Research Center (SRC) at the University of Wisconsin – River Falls mailed surveys to a random sample of 1,536 households (owner-occupied and renter-occupied) in the 36 Wisconsin counties that are partially or totally within the Lake Michigan or Lake Superior basins. **Counties included in the study are listed in Table 1a and shown in Map 1 below.** The surveys were followed by post card reminders and a second mailing to non-respondents. The overall response rate was 25 percent (383 completed questionnaires). Based on the number of households in the 36 counties (1,441,549¹), the results provided in this report are expected to be accurate to within plus or minus 5.0 percent with 95 percent confidence. This means that if this survey was replicated 20 times, only once would the results be expected to fall more than 5.0 percent above or below the values reported in this report.

Any survey has to be concerned with “non-response bias.” Non-response bias refers to a situation in which people who don’t return a questionnaire have opinions that are systematically different from the opinions of those who return their surveys. **Based upon a standard statistical analysis that is described in Appendix A, the SRC concludes that there is little evidence that non-response bias is a concern for this sample.**

In short, the data gathered in this survey are expected to accurately reflect the opinions of the general public residing in the 36 Wisconsin counties included in the study.

In addition to the numeric responses, respondents provided additional written comments which were compiled by the SRC from the surveys. **Appendix B to this report contains the complete compilation of comments.**

Appendix C contains a copy of the survey questionnaire with quantitative summaries of responses by question.

Appendix D contains a map of counties included in the study with an accompanying legend to identify individual counties by name.

¹ US Census, 2010.

Profile of Respondents

Table 1 summarizes the demographic profile of the survey respondents from the 36-county study area. Where comparable data were available from the 2010 Census of Population or the American Community Survey for the State of Wisconsin, they were included to indicate the degree to which the sample aligns with the overall adult population of the State.

The sample contained about the same number of men as women, and closely aligns with the gender distribution among the State's population.

There are fewer people under 45 years of age in this sample than the State average. In particular young adults, ages 18-24, are underrepresented in the sample. Our experience is that younger residents are less likely to participate in surveys than are their older neighbors. Further, it is probably true that unused medicines are a bigger issue for older Wisconsinites and, therefore, a topic in which they have more interest and inclination to complete a survey. About 20 percent of the questions in the survey showed a statistically significant difference between the opinions of those who are age 45 and above and those who are younger than that. An examination of those variables found no distinct pattern to the variables containing age-related differences. Furthermore, the sizes of the differences among the responses were generally quite small and did not alter the overall response pattern and interpretation of the results. Thus, the shortage of younger respondents does not seem to detract from the representativeness of the sample.

The respondents also had higher levels of formal education than would be expected. About 23 percent of the questions had statistically significant differences between those who had post-high school education and those without higher education. An examination of those variables found no distinct pattern to the variables containing age-related differences. The differences in the percentages of the responses were generally quite small and did not alter the overall interpretation of the results.

Additionally the respondents contained fewer households with annual incomes below \$15,000 and slightly more households between \$24,999 and \$50,000 than in the State as a whole. About 12 percent of the questions showed statistically significant differences between the opinions of those from households with \$50,000 or more annual income and those with less than \$50,000 annual income. Again, the differences in the percentages of the responses were generally quite small and did not alter the overall response pattern and interpretation of the results.

Table 1. Demographic Profile of Respondents							
Gender	Count	Male	Female				
Sample	374	53%	47%				
Wisconsin (Age 18+) ²	4,347,494	49%	51%				
Age 18+	Count	18 – 24	25 – 34	35 – 44	45 – 54	55 – 64	65+
Sample	370	2%	12%	13%	19%	26%	28%
Wisconsin ³	4,347,494	13%	17%	17%	20%	16%	18%
Highest Level of Education	Count	Less Than High School	High School Diploma	Some College/ Tech	Tech College Grad.	Bachelor's Degree	Graduate/ Professional Degree
Sample	362	2%	21%	23%	12%	24%	18%
Wisconsin ⁴ (age 25+)	3,761,656	10%	34%	21%	9%	17%	8%
Annual Household Income Range	Count	<\$15,000	\$15-\$24,999	\$25-\$49,999	\$50-\$74,999	75-99,999	\$100,000+
Sample	334	7%	9%	33%	21%	14%	16%
Wisconsin ⁵	2,272,274	12%	11%	27%	20%	13%	16%

² US Census, 2010

³ Ibid.

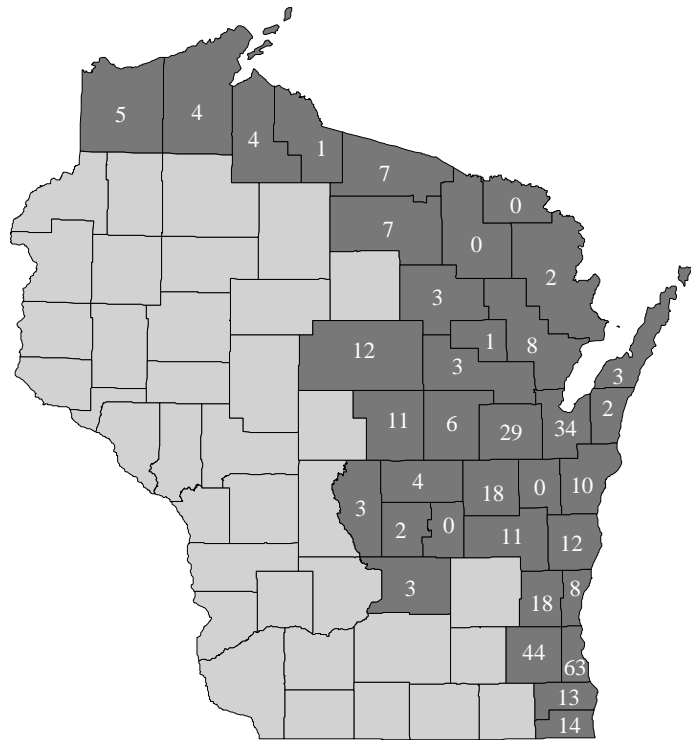
⁴ US Census, American Community Survey, 2009 estimate

⁵ Ibid.

Table 1a shows the count of respondents by county and the percentage of the total from each county. The accompanying Map 1 indicates the count from each county in the study area (dark gray). The responses closely matched the geographic distribution of households in the study area. In 32 of the 36 counties the deviation from the expected percentage was no more than one percent. However, there were fewer responses from Milwaukee County than expected. Milwaukee County comprises 27 percent of the households in the study area but represented 17 percent of the responses.

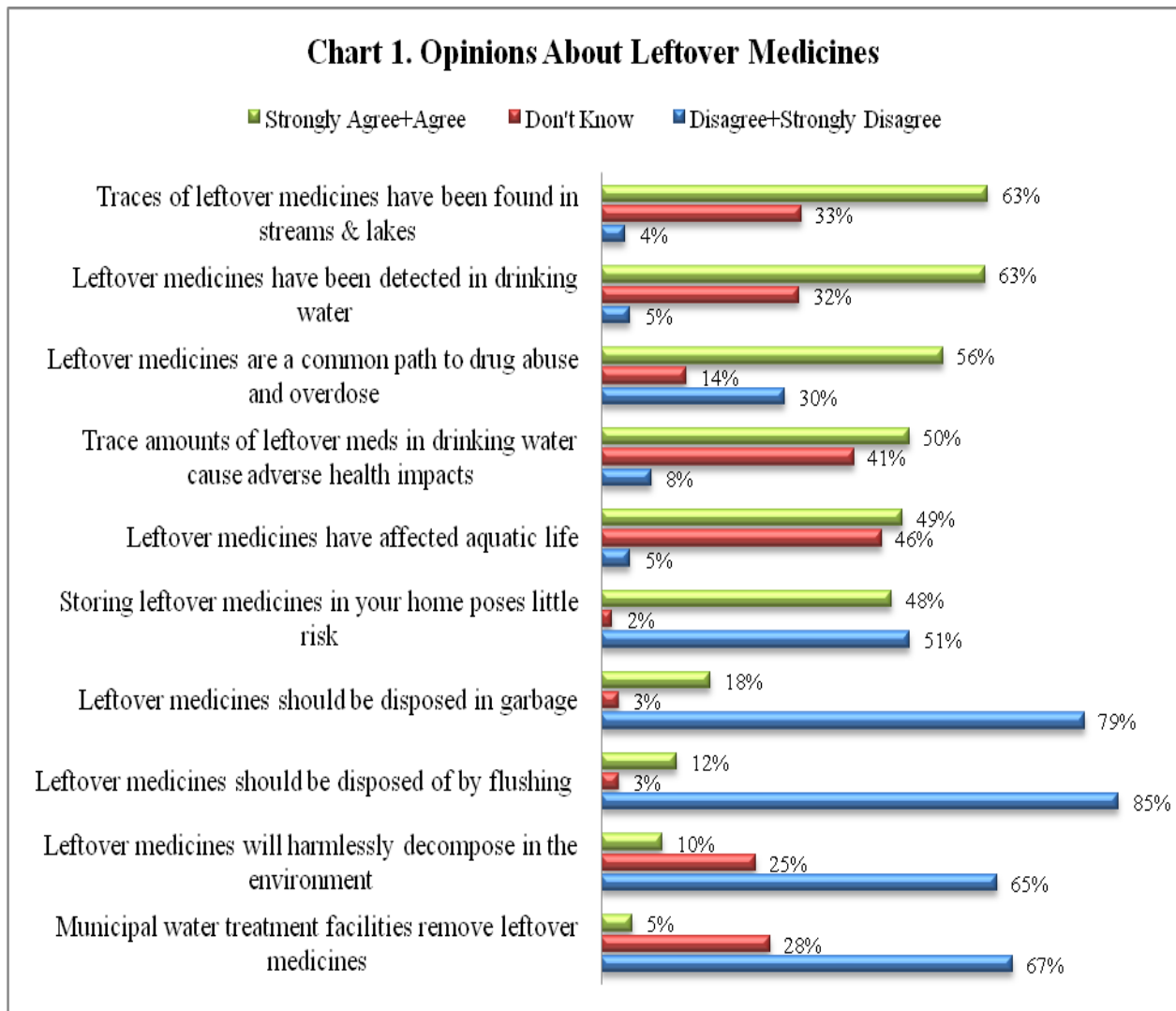
Table 1a. Respondents by County		
County	Count	Percent
Adams	3	1%
Ashland	4	1%
Bayfield	4	1%
Brown	34	9%
Calumet	0	0%
Columbia	3	1%
Door	3	1%
Douglas	5	1%
Florence	0	0%
Fond du Lac	11	3%
Forest	0	0%
Green Lake	0	0%
Iron	1	0%
Kenosha	14	4%
Kewaunee	2	1%
Langlade	3	1%
Manitowoc	10	3%
Marathon	12	3%
Marinette	2	1%
Marquette	2	1%
Menominee	1	0%
Milwaukee	63	17%
Oconto	8	2%
Oneida	7	2%
Outagamie	29	8%
Ozaukee	8	2%
Portage	11	3%
Racine	13	4%
Shawano	3	1%
Sheboygan	12	3%
Vilas	7	2%
Washington	18	5%
Waukesha	44	12%
Waupaca	6	2%
Waushara	4	1%
Winnebago	18	5%
Total	365	100%

Map 1. Number of Respondents by County



Opinions About Leftover Medicines

The first survey question presented a series of ten statements about unused medications and asked the respondents to indicate their level of agreement or disagreement. Chart 1 contains a summary of the responses. The top bar contains the combined percentages of those who said they “agree” and “strongly agree.” The middle bar represents those who chose the “don’t know” response, and the bottom bar contains the combined percentages of those who said they “disagree or “strongly disagree.”



Over 60 percent of respondents agreed or strongly agreed that leftover medicines have been found in surface waters and that trace amount of leftover medicines have been detected in drinking water supplies. At the same time, about a third of the respondents chose the “don’t know” response for both of these questions.

Although over half of respondents agreed that leftover medicines are a common path to drug abuse and overdoses, 30 percent disagreed or strongly disagreed.

About half of respondents agreed that trace amounts of leftover medicines found in drinking water supplies cause adverse effects on human health and have affected aquatic life. Nearly as many respondents said they did not know if trace amounts cause adverse health impacts or if they have affected aquatic life.

The public had split opinions about the risk of storing unused medicines in their homes. About the same proportion agreed or strongly agreed (48%) as disagreed or strongly disagreed (51%).

Respondents did not think that disposing of leftover medicines in the trash or flushing them is a good idea. More than eight in ten disagreed or strongly disagreed with either disposal method.

About two-thirds of respondents disagreed or strongly disagreed that leftover medicines will harmlessly decompose in the environment and that municipal water treatment facilities remove medicines that have been flushed down the toilet. A quarter of respondents said they “don’t know” if these statements are true.

In six of the ten statements in Chart 1, majorities of respondents chose the answer consistent with research findings:

- Leftover medicines have been found in lakes and streams. This statement is true, and 63 percent of respondents agreed or strongly agreed.
- Leftover medicines have been found to be a common path to drug abuse and overdoses. This statement is true, and 56 percent of respondents agreed or strongly agreed.
- Flushing leftover medicines down the toilet or sink is a safe disposal method. This statement is false, and 85 percent of respondents disagreed or strongly disagreed.
- Placing leftover medicines in the garbage is a safe disposal method. This statement is false in Wisconsin, and 79 percent of respondents disagreed or strongly disagreed.
- Municipal water treatment facilities remove medicines that have been flushed into the system. This statement is false, and 67 percent of respondents disagreed or strongly disagreed.
- Leftover medicines harmlessly decompose in the environment. This statement is false, and 65 percent of respondents disagreed or strongly disagreed.

There were four statements for which substantial percentages of the respondents’ answers do not match research findings.

- Although a majority of respondents agreed or strongly agreed that leftover medicines have found their way into drinking water supplies and that leftover medicines in drinking water have caused adverse human health impacts, there is insufficient scientific evidence to support these two statements.
- Half of respondents agreed there is little risk in storing leftover medicines at home, but public health officials have concluded that there is significant risk to retain leftover medicines in one’s residence.

- Nearly half (46%) of respondents disagreed that leftover medicines have affected aquatic life in rivers and lakes, but research has identified impacts on the growth and development of aquatic life.

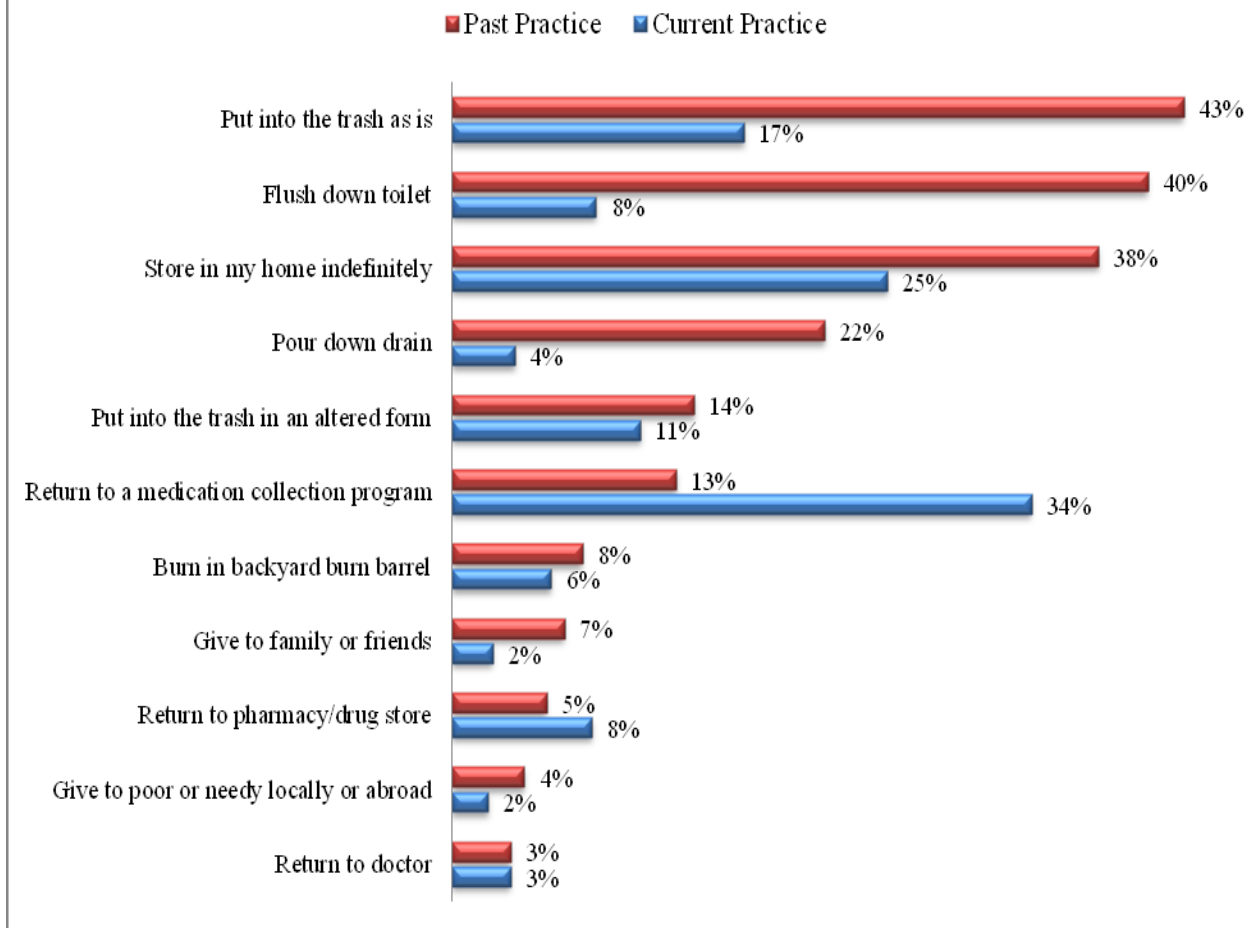
When combined with the high proportion of “don’t know” responses to the statements about technology and research, these results suggest an opportunity for information/education outreach efforts to increase public knowledge about issues and concerns associated with leftover medicines.

Demographic Comparisons: Women were more likely to say they don’t know if municipal water treatment facilities remove leftover medicines that have been flushed down the toilet. A greater proportion of respondents age 45 and older said they do not know if leftover medicines harmlessly decompose in the environment. Respondents with post-secondary education were less likely to say they don’t know if scientific studies have found that trace amounts of leftover medicines found in drinking water cause adverse human health affects and more likely to agree. Households with over \$50,000 annual income were more likely to disagree that leftover medicines should be disposed of by tossing them in the garbage.

Past and Present Disposal Practices

Respondents were presented a list of various disposal methods and asked to indicate which practices they have used in the past and which they are currently using. The results are summarized in Chart 2. The top bar shows past disposal practices, and the bottom bar shows current practices.

Chart 2. Past and Current Disposal Practices



Past practices. The three most frequent past practices listed by respondents were to put leftover medications in the trash without alteration (43%), to flush the medicines down the toilet (40%), and to store the medicines at home for an indefinite period (38%). Between 13 percent and 22 percent said their past practices included pouring unused medicines down the sink, placing the leftover medicines in the trash in an altered form (e.g., mixed with kitty litter, etc.), or returning medications to a collection program. Fewer than 10 percent of the respondents said they had burned the leftovers in a backyard burn barrel, given unused medicines to family or friends, given leftover medicines to the poor, or returned their unused medicines to a pharmacy or physician.

Demographic comparisons: Men and respondents under age 45 were less likely to have flushed unwanted medicines down the toilet. Those with post-secondary education were more likely to store their unwanted medicines in their homes indefinitely.

Current practices. Currently, the two most frequently used disposal methods are to return unwanted medicines to a collection program (34%) and storage of the leftover medicines in their homes (25%).

About one in six reported placing the medicines in the trash in an unaltered form, while 11 percent alter the medicine before placing it in their garbage. Fewer than 10 percent are currently using any of the remaining listed disposal methods, i.e., burn in back yard burn barrel, give to family or friends, return to pharmacy, give to the poor, return to doctor, or pour down the sink.

Demographic comparisons: There were no substantial differences among the demographic groups regarding current disposal practices.

Changes in disposal practices. A comparison of the past and current practices in Chart 2 indicates a substantial change in the disposal practices among respondents. Fortunately the largest changes are decreases among the practices that are harmful to the environment.

- Flushing leftover medicines down the toilet dropped from 40 percent to 8 percent;
- Disposal in the trash in an unaltered form decreased from 43 percent to 17 percent;
- Disposal down the sink dropped from 22 percent to 4 percent.
- Storage for an indefinite period of time in their homes decreased from 38 percent to 25 percent.
- The use of collection programs has increased substantially, rising from 13 percent to 34 percent.

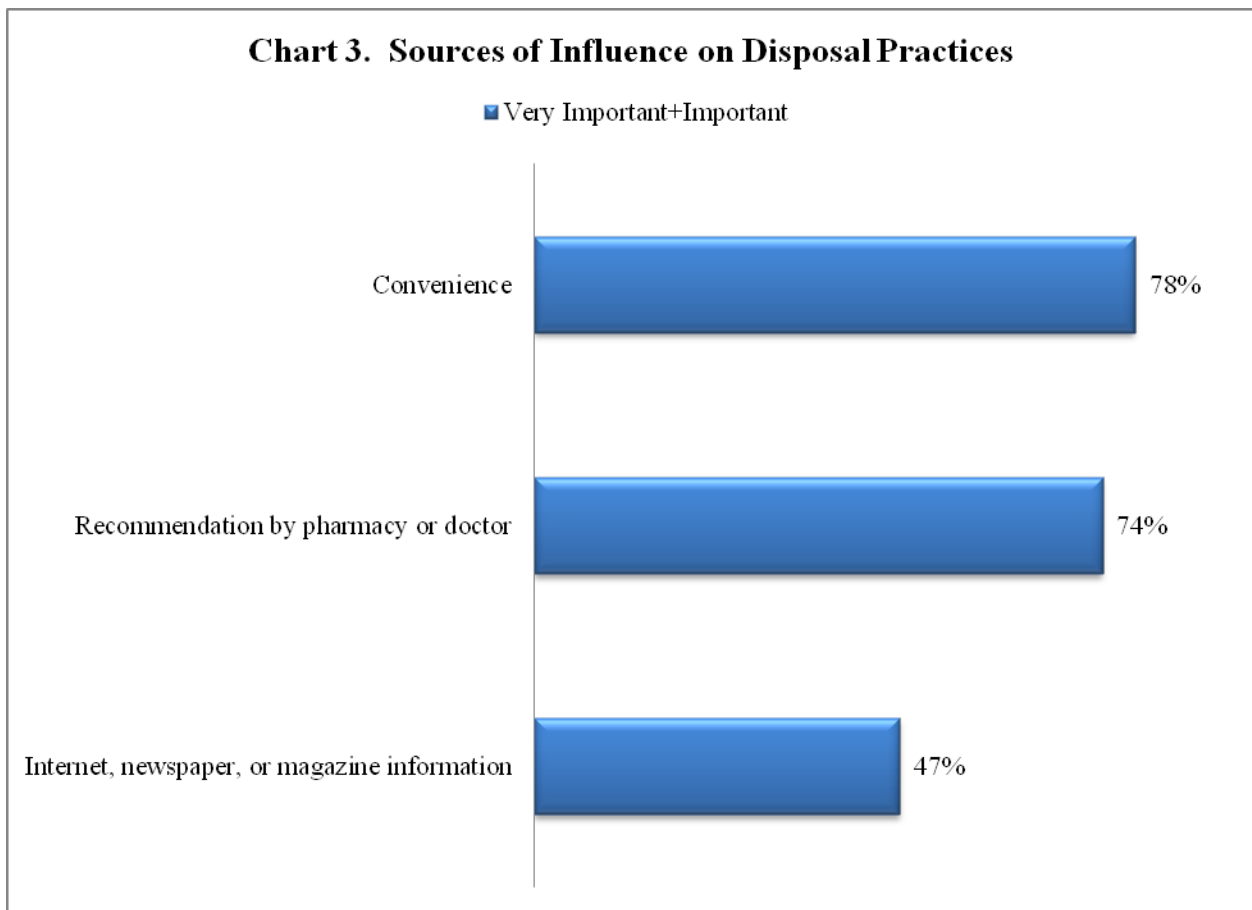
From a public policy perspective, the results in Chart 2 are somewhat encouraging. The public seems to be open to changing their practices with respect to disposing of leftover medicines. These changes suggest that people are quite interested in “doing the right thing” with respect to the responsible disposal of pharmaceutical products. However, the declines in the less environmentally sound means of disposal (flushing, putting in the trash, etc.) are greater than the increase in the more acceptable disposal methods (collection programs, returns to pharmacy, etc.). Together, these results indicate that a little education coupled with expanded disposal opportunities could be expected to have a substantial impact.

Demographic comparisons:

- Women and respondents age 45 and older were more likely to have stopped flushing leftover medicines down the toilet.
- Households with annual incomes between \$25,000 and \$74,999 were more likely to have stopped storing leftover medicine in their residences.

Sources of Influence on Disposal Practices

Respondents were next asked to rate the importance of three factors in terms of how they choose to dispose of leftover medicines: convenience, recommendation by a pharmacist or doctor, and information from the internet, newspaper, or magazine. The results are shown in Chart 3 and indicate that convenience and the recommendation by a doctor or pharmacist are the most influential factors. About three-fourths of respondents said convenience and a recommendation by a pharmacist or doctor were important or very important. Substantially fewer respondents, 47 percent, reported that media and the internet were important or very important sources of influence on their choice of disposal practices. It is likely that the greater importance placed on pharmacists' or doctors' recommendations reflects a preference for the personal contact/communication with a pharmacist or doctor compared to information available from the media or internet. The results shown in Chart 3 suggest that the public is more likely to properly and safely dispose of their leftover medicines when there is a convenient way to do so and when pharmacists and physicians have the appropriate information to share with their customers and patients. These results suggest that efforts to change the public's practices of disposing of unused medicines will be more successful if done in partnership with physicians and pharmacists and include programs with convenience as the main design element.



Demographic comparisons: Respondents with post-secondary education were slightly more likely to give a higher importance rating to information from the internet, newspaper, or magazine.

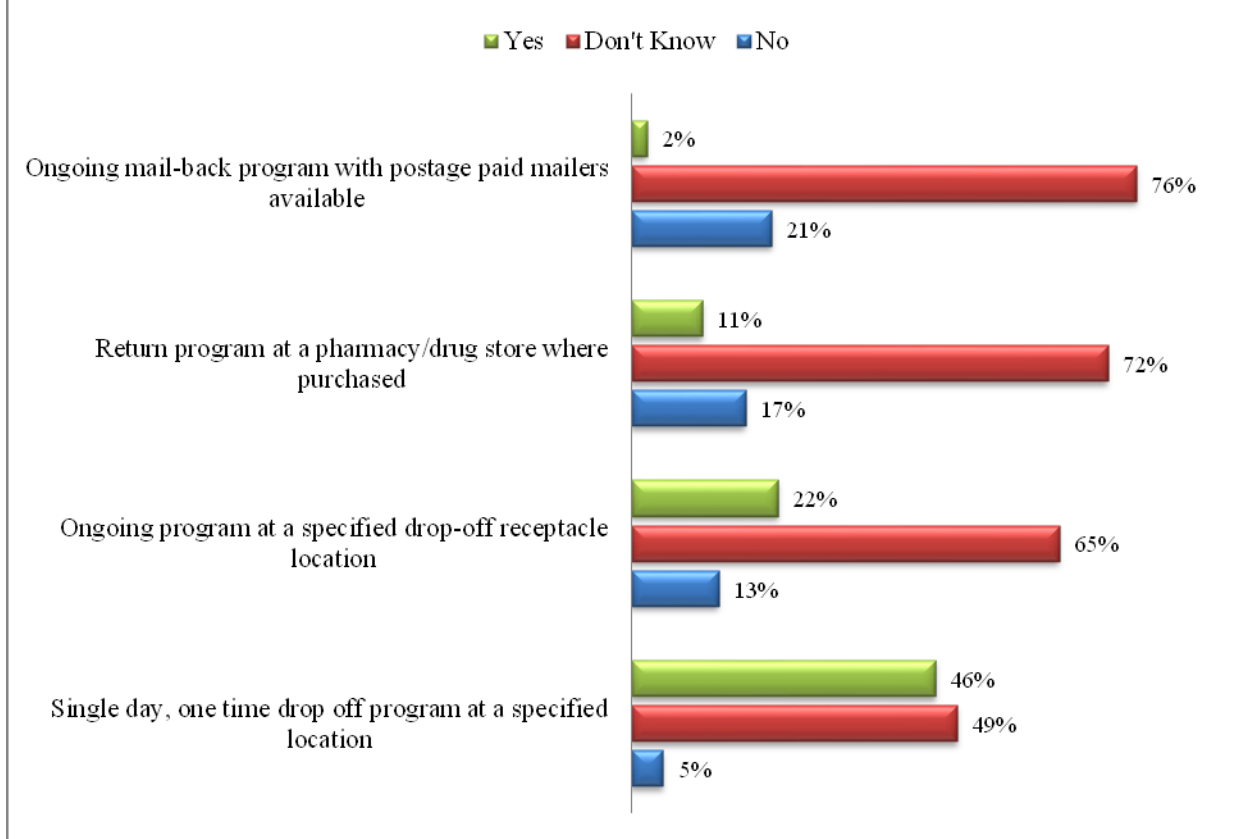
Awareness of Collection Programs

When asked which leftover medicine disposal collection programs are available in their community, Chart 4 shows that substantial percentages of respondents do not know whether they are available or not (middle bar). This was particularly true for mail-back programs (76%) and collection programs at pharmacies (72%). These results are not surprising since mail-back programs have been held in only two counties in Wisconsin (Waukesha and Winnebago) and programs to return unwanted medicines containing controlled substances to pharmacies currently are not permitted under Wisconsin law. At least two-thirds of respondents said they did not know if these programs were available in their respective communities. Public awareness of single day, one-time drop-off events fared somewhat better; nevertheless fewer than half of the respondents said they were aware of such an event in their community. The top bar shows the “yes” responses, and the bottom bar shows the “no” responses.

There was insufficient data to compare the individual responses to the actual availability of various collection programs in the respondent’s community. Thus, it is impossible to determine whether the high proportion of “don’t know” responses is a reflection of lack of public awareness about programs that exist in the respondent’s community or whether the respondent’s community simply does not have any type of collection program.

Demographic comparisons: A higher proportion of respondents under age 45 said they did not know if their community had an ongoing collection program utilizing a drop-off receptacle with set hours.

Chart 4. Disposal Programs Available in Community

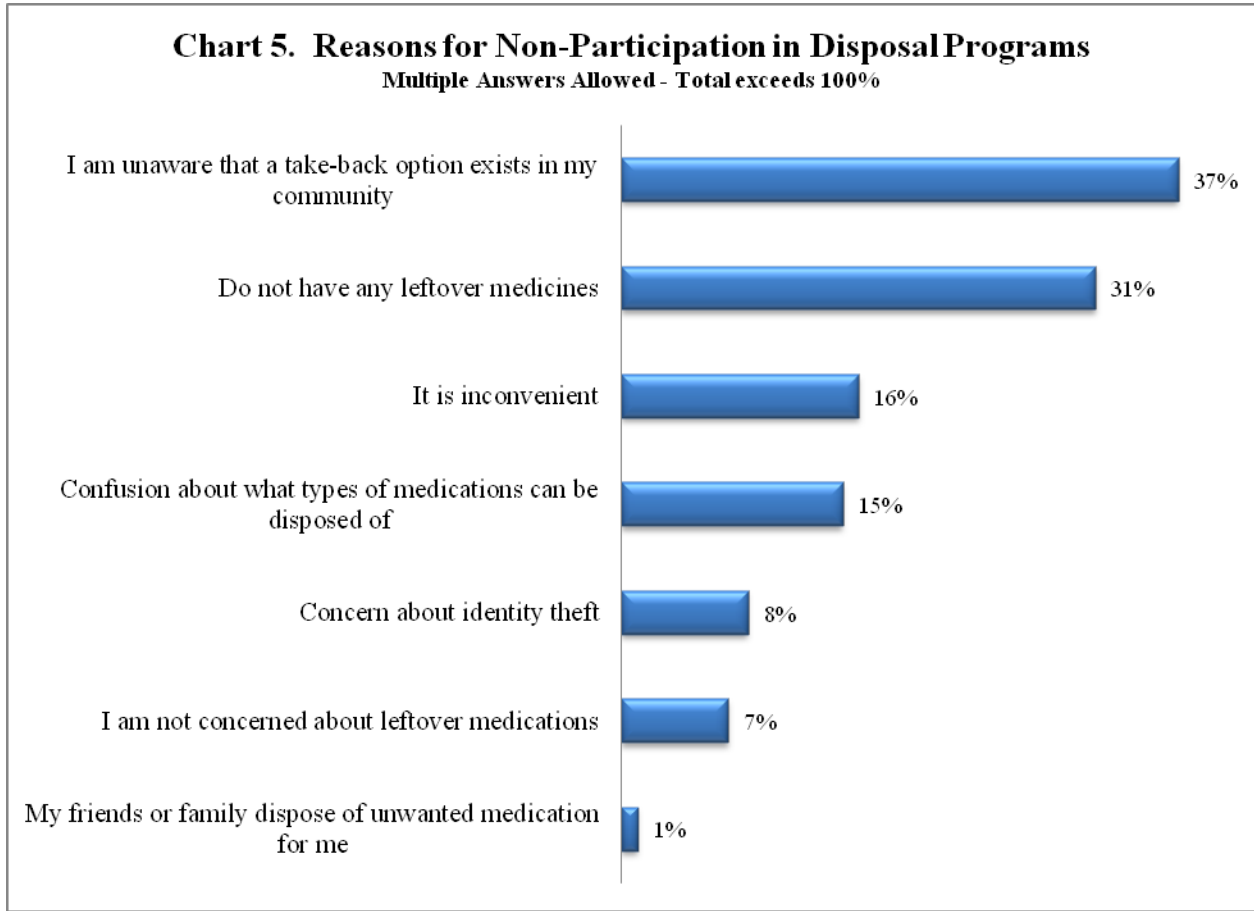


Impediments to Participation in Disposal Programs

Respondents were asked to identify all the reasons they chose not to participate in disposal programs. A quarter of the respondents said that none of the items in listed in the question was a reason for non-participation, and they did not write in a response in the “other” category. Of the 75 percent of respondents who identified a reason for non-participation, 60 percent had only one reason, and 85 percent had two or fewer reasons. Chart 5 shows that the primary reason was lack of awareness about the existence of a program in the respondent’s community (37%). About a third of respondents said they do not have leftover medicines to take to a disposal program. If there is good news in the answers to this question, it is that relatively few people said that the disposal program was inconvenient (16%) and that only 7 percent said they are not concerned about leftover medicines. Confusion about the types of medicine that are accepted through disposal programs was not a major impediment (15%). Less than 10 percent said concern about identity theft kept them from participating in a disposal program. From a program development perspective, effective promotion of collection opportunities appears to be the most important action to positively impact participation. Further research may indicate that establishing a network of convenient take back opportunities may also positively impact participation. Although inconvenience and lack of clarity about what leftover medicines are accepted by collection programs were not cited by large portions of the respondents as impediments, these

two factors were identified by enough respondents to indicate that there is potential room for improvement.

Demographic comparisons: Respondents with post-secondary education were less likely to say they don't have any leftover medicines.

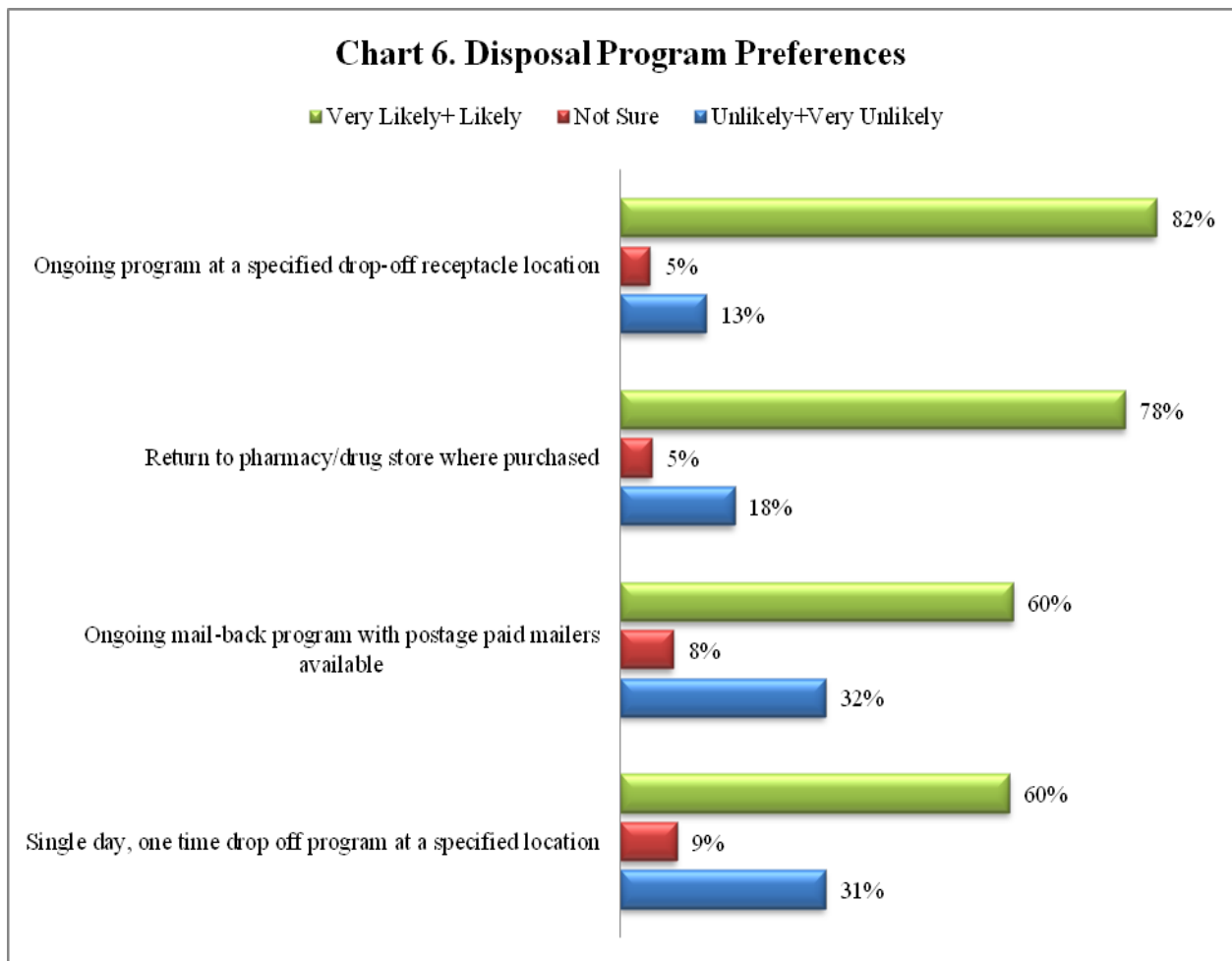


Preferences for Leftover Medicine Disposal

Respondents were asked to identify the types of disposal programs they would be most likely to use. As shown in Chart 6, the choices were an ongoing collection receptacle, return to pharmacy, mail-back in a return envelope, and single day, one time drop off collection events. The top bar is the combined “very likely” and “likely” responses. “Not sure” responses are shown in the middle bar, and the bottom bar contains the combined “unlikely” and “very unlikely” responses. Although a majority of respondents said they would be likely to use any of the choices listed, two types of programs clearly were more popular. About four in five respondents said they would be likely or very likely to use an ongoing drop-off receptacle or to return their unused medicines to the pharmacy where they were originally purchased. Both of these options would appear to align with the importance respondents’ attached to convenience (Chart 3) in a return program.

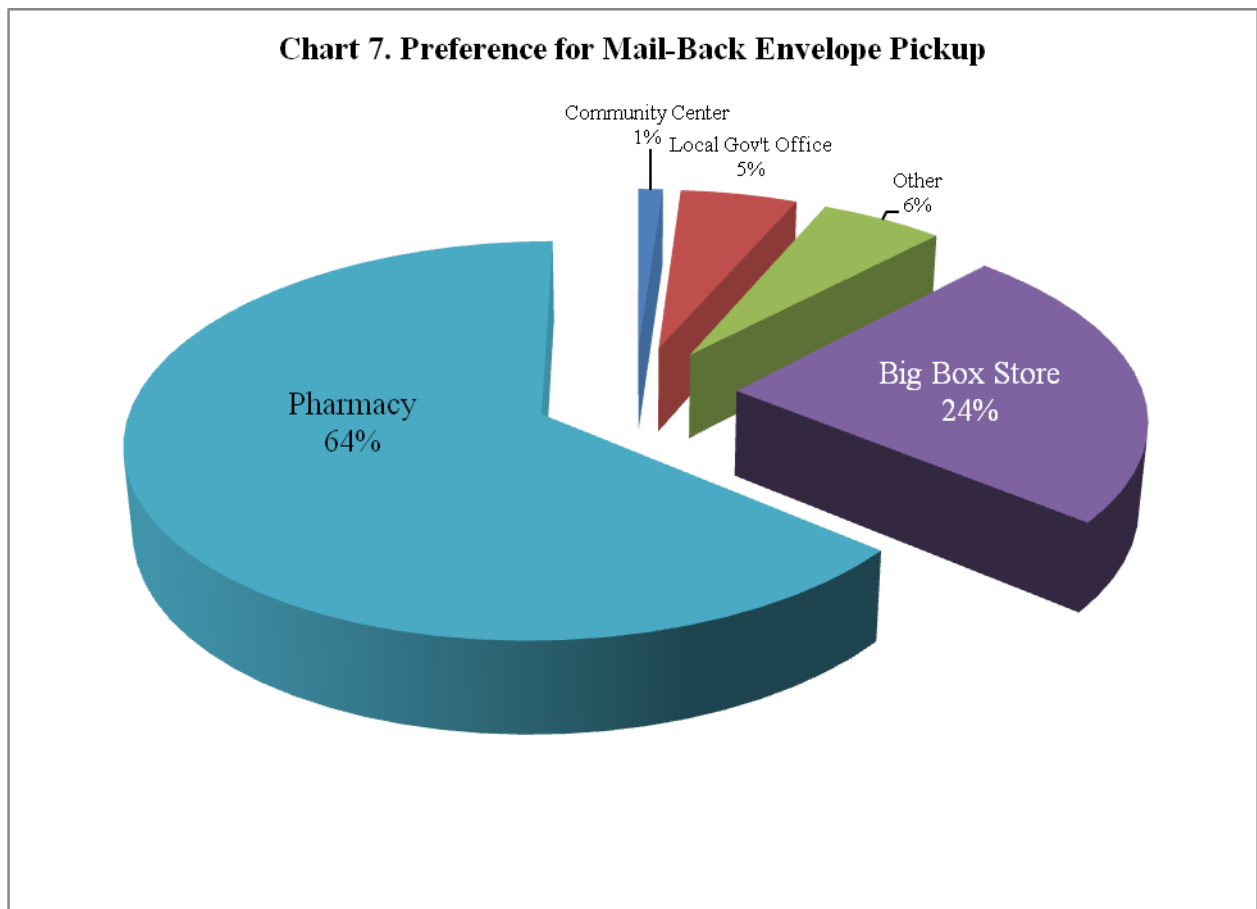
Six in ten respondents said they would be likely or very likely to use a mail-back program or to participate in a single day collection event.

Demographic comparisons: There were no significant differences among the demographic groups about their preferences for disposal programs.



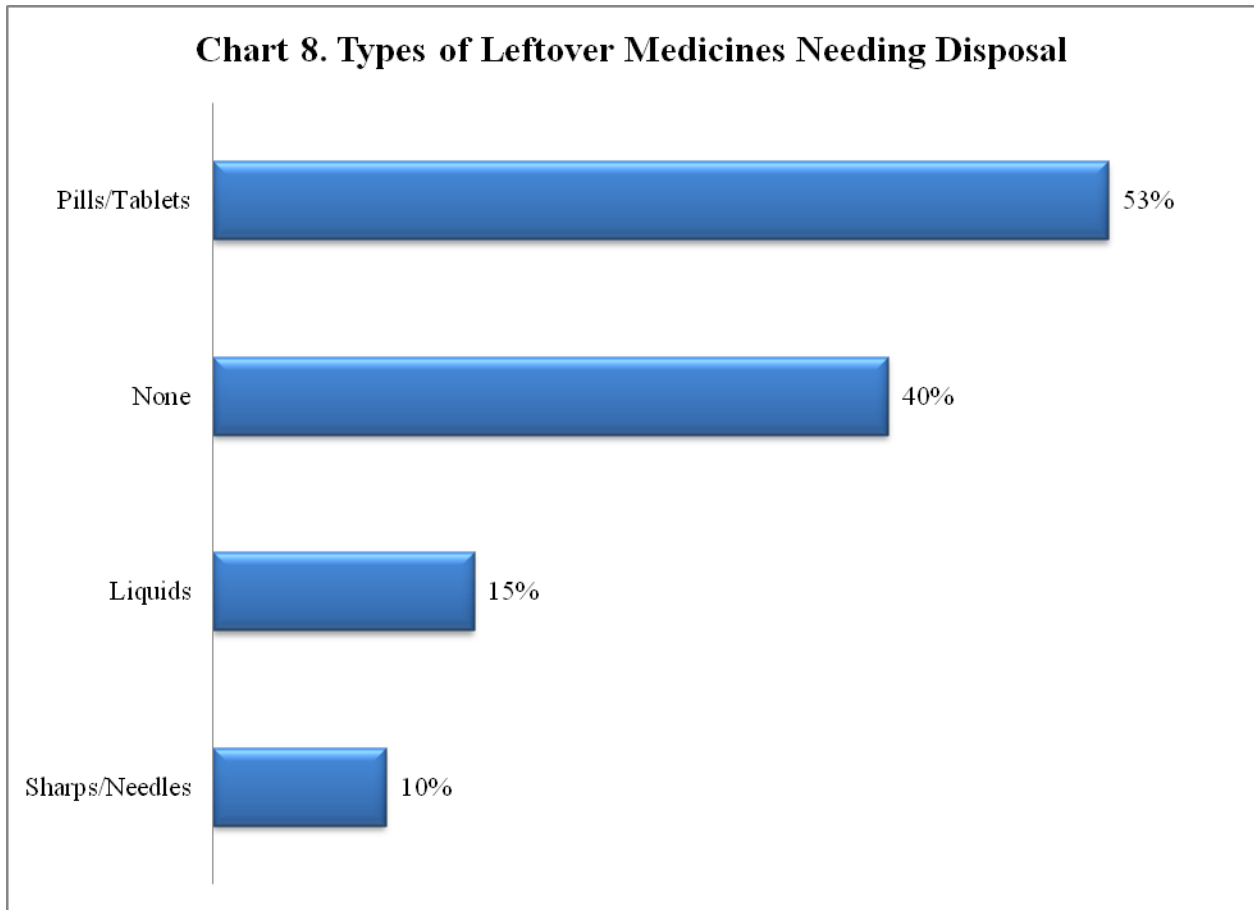
When asked to identify the most convenient location for obtaining a mail-back envelope if a free mail-back program was offered, Chart 7 shows that respondents mostly prefer a pharmacy (64%). A big-box store came in a distant second place (24%). Very few respondents said their first preference would be to pick up envelopes at a local government office or community center.

Demographic comparisons: There were no significant differences among the demographic groups about their preferences with respect to mail-back envelope pickup sites.



As shown in Chart 8, 40 percent of respondents said they have no leftover medicines. Among the 60 percent with leftover medicines, most leftovers are in pill or tablet form. Relatively few households reported having liquids or sharps/needles needing disposal.

Demographic comparisons: A higher percentage of respondents under age 45 said they have no leftover medicines. A higher percentage of respondents age 45 and older reported their leftover medicines are in pill or tablet form.



Conclusions

If the goal of public policy is to improve the responsible disposal of unused medicines, the results of this survey are encouraging. Respondents are generally aware of environmental and personal safety risks of improper disposal of leftover medicines. Substantial percentages of respondents have stopped using undesirable disposal methods such as flushing those products down the toilet or sink. There has been an accompanying, but somewhat smaller, increase in the percentage of respondents who participate in collection programs. Among those who have not participated in collection programs, relatively few cite a lack of concern about leftover medicines as a factor in their decision.

There is still room for improvement. Educational outreach programs may increase public knowledge about current research findings as they pertain to the impact of leftover medicines on the environment as well as correcting existing misperceptions about the risks of leftover medicines being stored at home. Additionally, there is a high proportion of respondents who are not aware of the availability of collection programs in their communities, either because local programs are not available or because large portions of the public have yet to be reached by information and promotional activities. To the extent that a lack of awareness reflects that collection programs do not exist in these respondents' communities, it points to a need to expand the availability of collection programs. To the extent that the lack of awareness exists in places where collection programs are available, it points to a need for additional promotion and publicity.

Based on the preferences expressed by respondents, planners of take-back programs should probably involve pharmacists and doctors in their efforts to reach more of the population with pertinent information and publicity and to utilize ongoing drop-off programs (collection receptacle or return to pharmacy). Respondents said they are less likely to participate in a mail-back program.

Overall, the data in this study indicate a willingness among the public to change their behavior if they are given disposal options that meet their criteria for convenience and if they are aware of the disposal options. As noted earlier in the report, these results suggest that a little information coupled with expanded disposal opportunities could be expected to have a substantial impact.

Appendix A – Non-Response Bias Test

Any survey has to be concerned with “non-response bias.” Non-response bias refers to a situation in which people who don’t return a questionnaire have opinions that are systematically different from the opinions of those who return their surveys. For example, suppose most non-respondents currently return unused medicines to their physician (Question 3j), whereas few of those who returned their questionnaire said they currently return their unused medicines to their doctor. In this case, non-response bias would exist, and the raw results would understate the public’s preference of disposing of leftover medicines by returning them to their physician.

The standard way to test for non-response bias is to compare the responses of those who return the first mailing of a questionnaire to those who return the second mailing. Those who return the second questionnaire are, in effect, a sample of non-respondents (to the first mailing) and one can assume that they are representative of that group. In this survey 192 people responded to the first mailing, and 191 responded to the second mailing.

The SRC found seven variables with statistically significant differences between the mean responses of these two groups (Table A1) out of 52 tested. Table A1 indicates that even when statistical differences exist, the magnitude of this difference is small and did not affect the interpretation of the results. **The SRC concludes that there is little evidence that non-response bias is a concern for this sample.**

Table A1 – Statistically Significant Differences Between Responses of First and Second Mailings of the Survey			
Variable	Statistical Significance	Mean First Mailing	Mean Second Mailing
1c. Leftover medicines should be disposed of by flushing down the drain or toilet	.017	4.35	4.12
1e. Municipal water treatment facilities remove leftover medicines that are flushed down the toilet	.038	3.58	3.24
2d. Put into the trash as is	.011	.49	.36
3c. Store in my home indefinitely	.007	.31	.19
3f. Burn in backyard burn barrel	.008	.03	.09
6a. Do not have any leftover medicines	.000	.23	.40
9. Pills or Tablets	.012	.59	.47

Appendix B – Comments

Q2. How have you disposed of medications in the past? ‘Other’ Responses (6 Responses)

- Used/Consumed them all (4x)
- Never had leftovers
- Take to the court house box collector

Q3. How are you currently disposing of medications? ‘Other’ Responses (12 Responses)

- Never had leftovers (4x)
- Use them up (4x)
- Destroy with water and flour in plastic bag
- Prescription drug collection center, waste disposal
- Rarely have left over
- Use police department disposal drop-off

Q2 and 3-Neither circle checked- ‘Other’ Responses (21 Responses)

- No leftovers (4x)
- Hold onto (2x)
- I take no medication at the present (2x)
- At 81 years, I use no medical pills
- Burn, or give to collection agency
- Crush
- Didn't have medication or used it all
- Dissolved in tap water
- Finish all medication your doctor tells you to take.
- Home waste can
- I just spent about \$285.00 on meds before my husband died. I gave them to his dialysis center hoping they would benefit.
- I keep them out of reach
- Meds go to disposal site
- No used meds to dispose of
- Use all of prescription. Only put in trash once in a while
- [Illegible]

Q4. How important are each of the following in terms of how you dispose of unused medications? ‘Other’ Responses (27 Responses)

- I use as directed there is no left over (3x)
- TV-educate us on correct methods (2x)
- Announcement on radio
- At 81 years I use no medical pills

- Collection Program
- Consistent message from multiple sources
- Cost
- Don't dispose, have none
- Education
- Environmental Impact
- Flammable
- Guarantee that they will not be redistributed
- If they dispense they should accept at all pharmacy
- Internet
- Learned while studying to be RN
- Peer-reviewed research publicist
- Personal Responsibility
- Radio or T.V. collection announcements
- See above (F)
- Service Orgs/Churches/Schools- As a place to be informed and parents have public place to easily dispose of meds.
- Sheriff Dept. notifications
- Should have regular disposal area. Some covered container located right in the pharmacy.
- Water Utility Recommendation
- Would like report (more) information given the more frequent short TV updates on inappropriate use of prescription drugs w/ teens.

Q6. If you do not use a medicine collection program, why not? 'Other' Responses (33 Responses)

- Don't use medication (2x)
- Dispose in coffee grounds; I have very few to dispose of
- Don't have a lot of leftover medications to dispose
- Don't know about it
- Don't want pills to be reused. Local program requires pills be left in original bottles which makes me believe they reuse them.
- Forget about them in the medicine cabinet, which we do not use
- Have not dropped off yet at police station
- Have only vitamins and herbal supplements to dispose of. Always try to finish all prescriptions up completely.
- I am a caregiver and our practice is to dispose of in a coffee container with used grounds or kitty litter.

- I am going to try to return unused medications to the pharmacy to so if they will take them back.
- I checked the internet and could not find any disposal for my community, still trying to locate program.
- I dispose of un-needed medication in the trash, goes to landfill.
- I don't use
- I know how to dispose of them properly
- I rarely use the collection program because I use very few pharmaceuticals
- I research if expiration dates are warranted and for the most part use OTC medicines until they're gone. Use prescription meds as directed and usually run out before expiration.
- I utilize program at work. Less than 30 miles from home/community
- Identity theft is always a concern in this regard.
- If we have a collection program, it is kept a secret.
- If you use the medication prescribed, there won't be any left
- Lack of publicity, unavailable on collection dates
- Medical Associated and Walgreens will not accept drop offs
- Must be in original bottle
- New to city. Does not know all options.
- Not as often as we'd like.
- Not publicized.
- Recently moved to Wisconsin and need to be better acquainted with program and plan accordingly
- Usually no medicine leftover
- Was not aware of a program
- We have very little and eventually will drop it off
- When take back programs exists
- Where is the bin 54301

Q8. If a free mail-back program for unused medications were available in your area, what would be the most convenient location for obtaining a mail-back envelope? 'Other' Responses (26 Responses)

- Post Office (8x)
- Grocery Store (5x)
- Walgreens (2x)
- Will not use (2x)
- Bank
- Don't like the idea of medicines in the mail
- Gas stations
- Get by mail from mail order pharmacy

- Home
- No Choice
- Other place of purchase
- Police Station
- Shopko

Q9. What types of medicines do you still need to dispose of? ‘Other’ Responses (6 Responses)

- Creams
- Inhalers and nasal spray
- Leftover nebulizer liquid medicine container. Previously tried to deposit w/ Theda Clark emergency room collection center of the E.R. Twice they told me to just throw in the garbage! The vials still contain trace amount of medication that we don't want in the environment. Educate them please.
- Pain Medicine
- Patch
- Vitamins

Q15. What is your zip code?

53001	53090 (5x)	53195
53005 (2x)	53092 (2x)	53202
53010	53095 (5x)	53204 (2x)
53012 (3x)	53105 (2x)	53207 (5x)
53017	53110	53209 (3x)
53018	53118 (2x)	53210
53021	53122	53211 (5x)
53022 (4x)	53125	53213
53023	53129 (2x)	53213 (2x)
53024	53132 (4x)	53214 (3x)
53027 (2x)	53140	53215
53037	53142 (5x)	53216 (2x)
53042	53143	53217
53045 (2x)	53144 (2x)	53218
53049	53149	53218 (3x)
53051 (9x)	53150 (6x)	53219 (2x)
53063	53151 (4x)	53220 (3x)
53066 (4x)	53154 (2x)	53221 (5x)
53072 (2x)	53158 (2x)	53222
53073 (2x)	53168	53224 (2x)
53079	53172 (2x)	53225
53080	53181	53226 (2x)
53081 (4x)	53186 (4x)	53228
53083 (2x)	53188 (4x)	53233
53085 (2x)	53189	53237
53089	53192	53285

53402	54227	54558
53402 (2x)	54229	54568 (2x)
53403	54235 (2x)	54806 (2x)
53405 (4x)	54241 (2x)	54820
53406 (2x)	54245	54838
53704	54247	54847
53925	54301 (2x)	54856
53934 (2x)	54302 (4x)	54865
53949	54303 (4x)	54880 (3x)
53954	54304 (2x)	54891
53955	54311 (5x)	54901 (2x)
53963	54313 (5x)	54902 (3x)
53964	54401 (2x)	54904
54101	54402	54911 (6x)
54113	54403 (2x)	54913 (2x)
54115 (8x)	54409 (2x)	54914
54124 (2x)	54424	54914 (2x)
54126 (2x)	54448 (3x)	54915 (7x)
54130 (4x)	54455	54935 (5x)
54143	54457	54937 (2x)
54150	54467	54940
54153	54476	54942 (2x)
54154 (2x)	54479	54947
54162	54481 (6x)	54949 (2x)
54165	54482 (4x)	54950 (2x)
54165 (2x)	54484	54952 (5x)
54166 (2x)	54487 (2x)	54956 (4x)
54170	54491	54963
54174	54501 (5x)	54970
54177	54521 (3x)	54981
54205 (2x)	54527	54982
54208	54534	54984 (2x)
54210	54540	
54220 (3x)	54546	

Appendix C—Quantitative Summary of Responses by Question

Unwanted Medication Disposal Survey Please return by April 22, 2011

Using blue or black ink, please fill the circle that most closely matches your response to the following questions or statement. Please fill the circle: Like this: ● Not like this: ✓ ✗ /

I. Opinions

1. Please give us your opinion about the following statements about leftover medicines, which are prescriptions, over-the-counter medicines, vitamins, or herbal supplements that are past their expiration date or are no longer being used on a regular basis.

	Don't Know	Strongly Agree	Agree	Disagree	Strongly Disagree
a. Storing leftover medicines in your home poses little risk	2%	11%	36%	36%	15%
b. Leftover medicines are a common path to drug abuse and overdoses	14%	17%	39%	25%	6%
c. Leftover medicines should be disposed of by flushing down the drain or toilet	3%	3%	9%	37%	48%
d. Leftover medicines should be disposed of by tossing them in the garbage	3%	2%	16%	39%	40%
e. Municipal water treatment facilities remove leftover medicines that are flushed down the toilet	28%	1%	5%	38%	30%
f. Leftover medicines have been detected in drinking water supplies	32%	24%	39%	4%	1%
g. Scientific studies have found that trace amounts of leftover medicines found in drinking water cause adverse human health affects	41%	16%	35%	8%	1%
h. Leftover medicines will harmlessly decompose in the environment	25%	2%	8%	43%	21%
i. Traces of leftover medicines have been found in streams, rivers, and lakes throughout the U.S.	33%	19%	44%	3%	1%
j. Scientific studies have found that leftover medicines have affected the growth/development of aquatic life	46%	14%	35%	4%	1%

II. Practices/Information

In the following two-part question, we want to know **how you have disposed of leftover medications in the past and how are you currently disposing of them?** Please fill in any circle that describes how you have disposed of leftover medications in the past and any that describe how you are currently disposing of them.

	2. Practices Used in Past	→	3. Practices Currently Using
a. Pour down the sink	22%		4%
b. Flush down the toilet	40%		8%
c. Store in my home indefinitely	38%		25%
d. Put into the trash as is	43%		17%
e. Put into the trash in an altered form (e.g. mixed with kitty litter, coffee grounds, etc)	14%		11%
f. Burn in backyard burn barrel	8%		6%
g. Give to poor or needy locally or abroad	4%		2%
h. Give to family or friends	7%		2%
i. Return to a medication collection program	13%		34%
j. Return to doctor	3%		3%
k. Return to pharmacy/drug store	5%		8%
l. Other, (specify): See Appendix B	2%		3%

4. How important are each of the following in terms of how you dispose of unused medications?

	Very Important	Important	Somewhat Important	Not Important
a. Convenience	33%	46%	15%	7%
b. Recommendation by pharmacy or doctor	32%	42%	18%	8%
c. Internet, newspaper, or magazine information	15%	33%	35%	18%
d. Other (specify): See Appendix B	52%	15%	11%	22%

5. Which of the following medicine disposal methods are available in your community?

	Yes	No	Don't Know
a. Single day, one time drop off program at a specified location and time	46%	5%	49%
b. Ongoing program at a specified drop-off receptacle location with set hours (e.g., police station)	22%	13%	65%
c. Ongoing mail-back program with postage paid mailers available at a set location (e.g., your pharmacy.)	2%	21%	76%
d. Return program at pharmacy/drug store where purchased	11%	17%	72%

6. If you do not use a medicine collection program, why not? (mark ● all that apply)

- 31% a. Do not have any leftover medicines
- 37% b. I am unaware that a “take-back” option exists in my community
- 16% c. It is inconvenient
- 7% d. I am not concerned about leftover medications
- 1% e. My friends or family dispose of unwanted medication for me
- 8% f. Concern about identity theft
- 15% g. Confusion about what types of medications can be disposed of in these programs
- 5% h. Other (specify): **See Appendix B**

7. For each of the following possible options for disposing of leftover medications, please indicate how likely it is that you would utilize one of these no-cost options.

	Not Sure	Very Likely	Likely	Unlikely	Very Unlikely
a. Single day, one time drop off program at a specified location and time	9%	25%	35%	23%	8%
b. Ongoing program at a specified drop-off receptacle location with set hours (e.g., police station)	5%	47%	35%	9%	5%
c. Ongoing mail-back program with postage paid mailers available at a set location (e.g., your pharmacy.)	8%	33%	27%	21%	11%
d. Return to pharmacy/drug store where purchased	5%	47%	31%	9%	8%

8. If a free mail-back program for unused medications were available in your area, what would be the most convenient location for obtaining a mail-back envelope? (mark • one choice only)

Pharmacy	Community Center	Local Government Office	Big Box Store (Wal-Mart, Target, etc.)	Other : See Appendix B
64%	1%	5%	24%	6%

9. What types of medicines do you still need to dispose of (mark • all that apply)?

None	Pills/ Tablets	Sharps/ Needles	Liquids	Other: See Appendix B
40%	53%	10%	15%	1%

III. Demographics

Finally, we'd like you to tell us a bit about yourself. Your answers are voluntary and will be confidential. Your name will never be linked to your responses.

10. Gender	Male	Female
	53%	47%

11. Age	18-24	25-34	35-44	45-54	55-64	65+
	2%	12%	13%	19%	26%	28%

12. Highest level of education	Less than high school	High school diploma	Some college/tech	Tech college graduate	Bachelor's degree	Graduate or professional degree
	2%	21%	23%	12%	24%	18%

14. Household Income Range	Less than \$15,000	\$15,000 – \$24,999	\$25,000 – \$49,999	\$50,000 – \$74,999	\$75,000 – \$99,999	\$100,000 or More
	7%	9%	33%	21%	14%	16%

15. What is your zip code? _____

We thank you for completing the survey!

Please return your survey in enclosed postage-paid envelope by **April 22, 2011** to:

Survey Research Center. UW- River Falls
 410 S. Third St. 124 RDI
 River Falls, WI 54022-5001

Appendix D—Counties Included in the Study

Table D1. Counties in Study Area

Key	County
1	Adams
2	Ashland
3	Bayfield
4	Brown
5	Calumet
6	Columbia
7	Door
8	Douglas
9	Florence
10	Fond du Lac
11	Forest
12	Green Lake
13	Iron
14	Kenosha
15	Kewaunee
16	Langlade
17	Manitowoc
18	Marathon
19	Marinette
20	Marquette
21	Menominee
22	Milwaukee
23	Oconto
24	Oneida
25	Outagamie
26	Ozaukee
27	Portage
28	Racine
29	Shawano
30	Sheboygan
31	Vilas
32	Washington
33	Waukesha
34	Waupaca
35	Waushara
36	Winnebago

Wisconsin Counties Partially or Totally In Great Lakes Drainage Basin

