Performance Improvement: Run Chart & Scatter Plot

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Susan Blackwell, MA
Christine De Rosa, PhD

Run Chart

What is it?

A line graph where a measure is plotted over time

- Changes in process can be marked on the graph to note impact on the process
  - Allows monitoring data over time
  - Compares measures before and after implementation to see impact
- Multiple data points (10 – 12) can help see random and non-random variation

Run Chart

How is it applied?

A run chart is a running record of a process over time

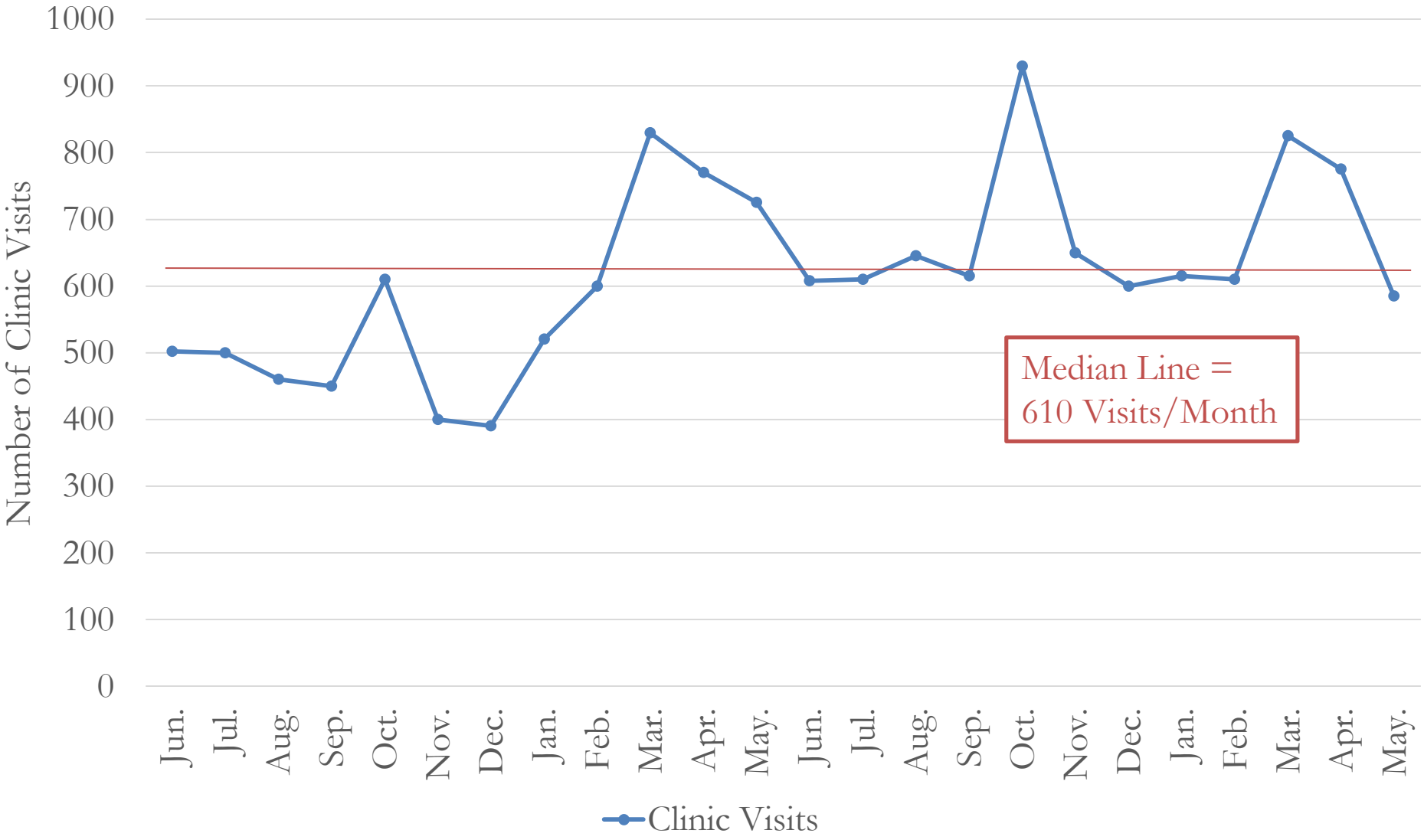
- The vertical axis is the process being measured
- The horizontal axis represents the units of time by which the measurements are made
- The centerline of the chart is the mean or average

Run Chart

Uses:

- To display data to observe performance over time
- To determine if a change resulted in improvement
- To assess whether improved performance has been sustained
- Usually sufficient for many improvement projects but not as sensitive as other tools at detecting variation due to other causes

Run Chart Example



Run Chart Activity: Study of Data Entry Errors

Purpose: understand time patterns in data entry errors

Data entry team

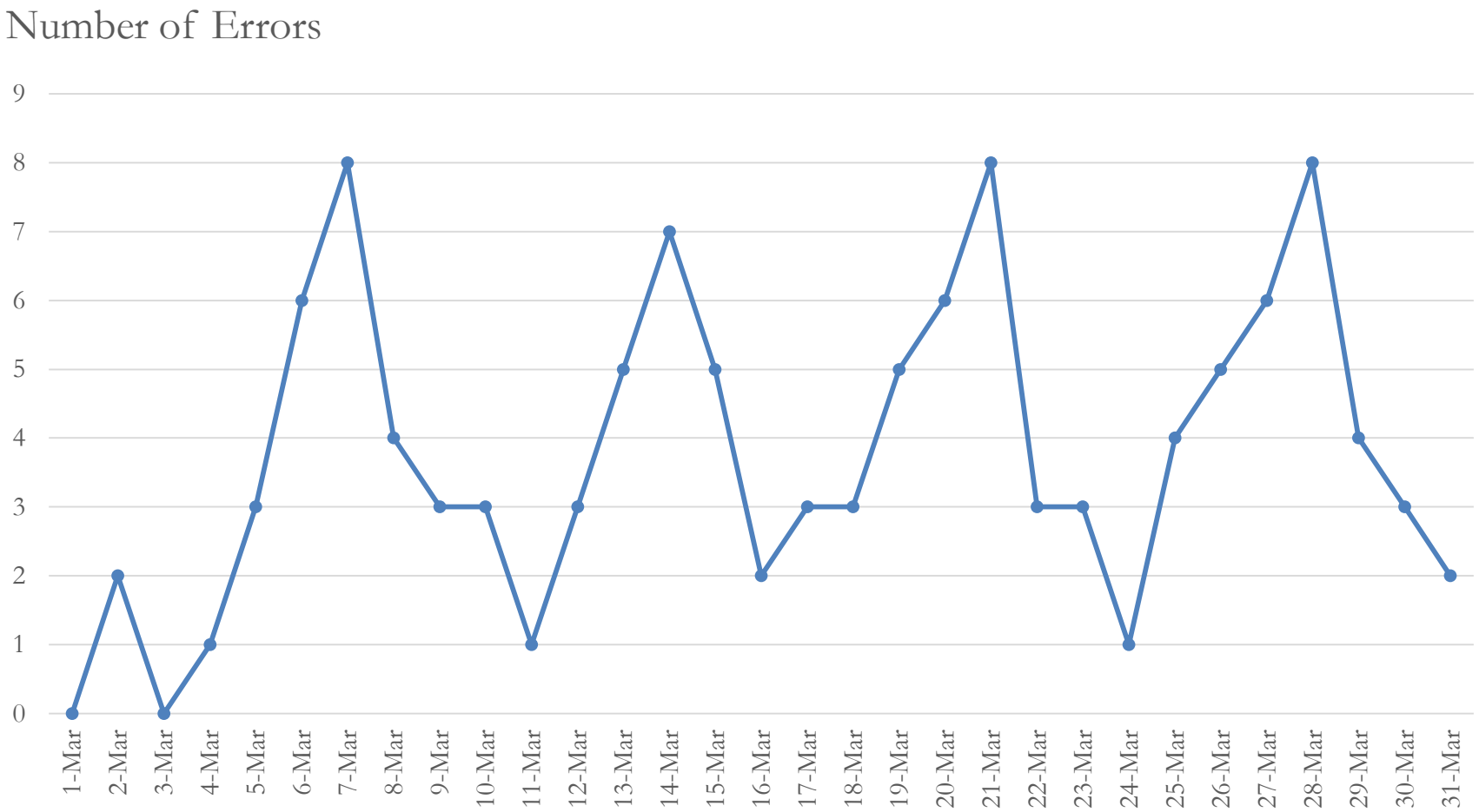
Month of March

Number of data errors per day

2016 MARCH

SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Data Entry Errors Run Chart



Conclusion

Data entry errors occur more frequently on Mondays.

Scatter Plot

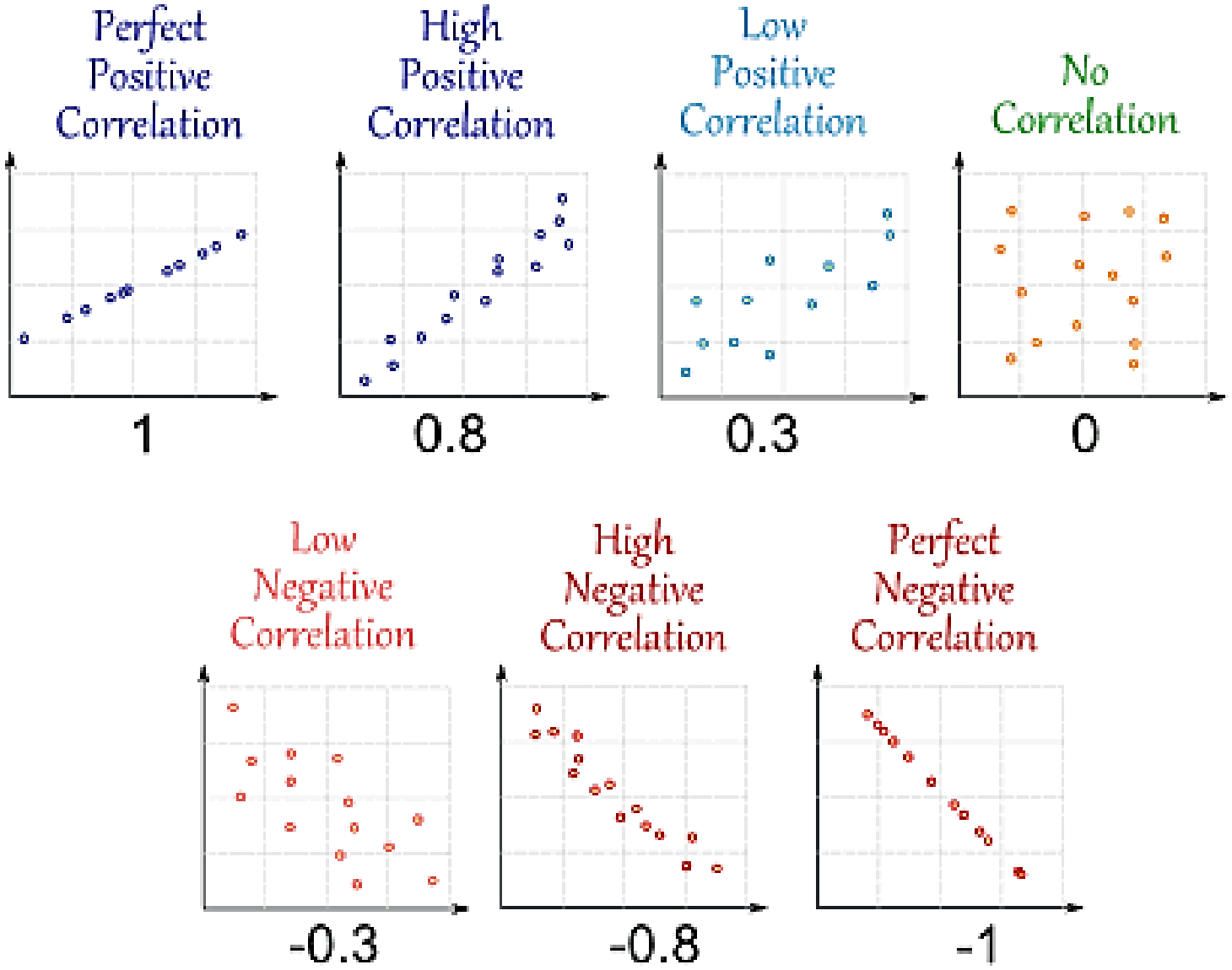
What is it?

- A graph that is used to look for relationships between two variables
- One variable is plotted on the horizontal axis and the other on the vertical axis
- Shows the correlation between two variables

Scatter Plot

How is scatter plot applied?

- Visual representation of relationship between two variables
- Shows: positively, negatively or not correlated at all
  - If the vertical variable increases as the horizontal variable increases, that indicates a positive correlation
  - If the vertical variable decreases as the horizontal variable increases, that indicates a negative correlation
  - If the dots are scattered all over the graph, there is no correlation between variables
- Also can show strength of the correlation



Scatterplot examples from https://www.mathsisfun.com/data/scatter-xy-plots.html

Scatter Plot Activity

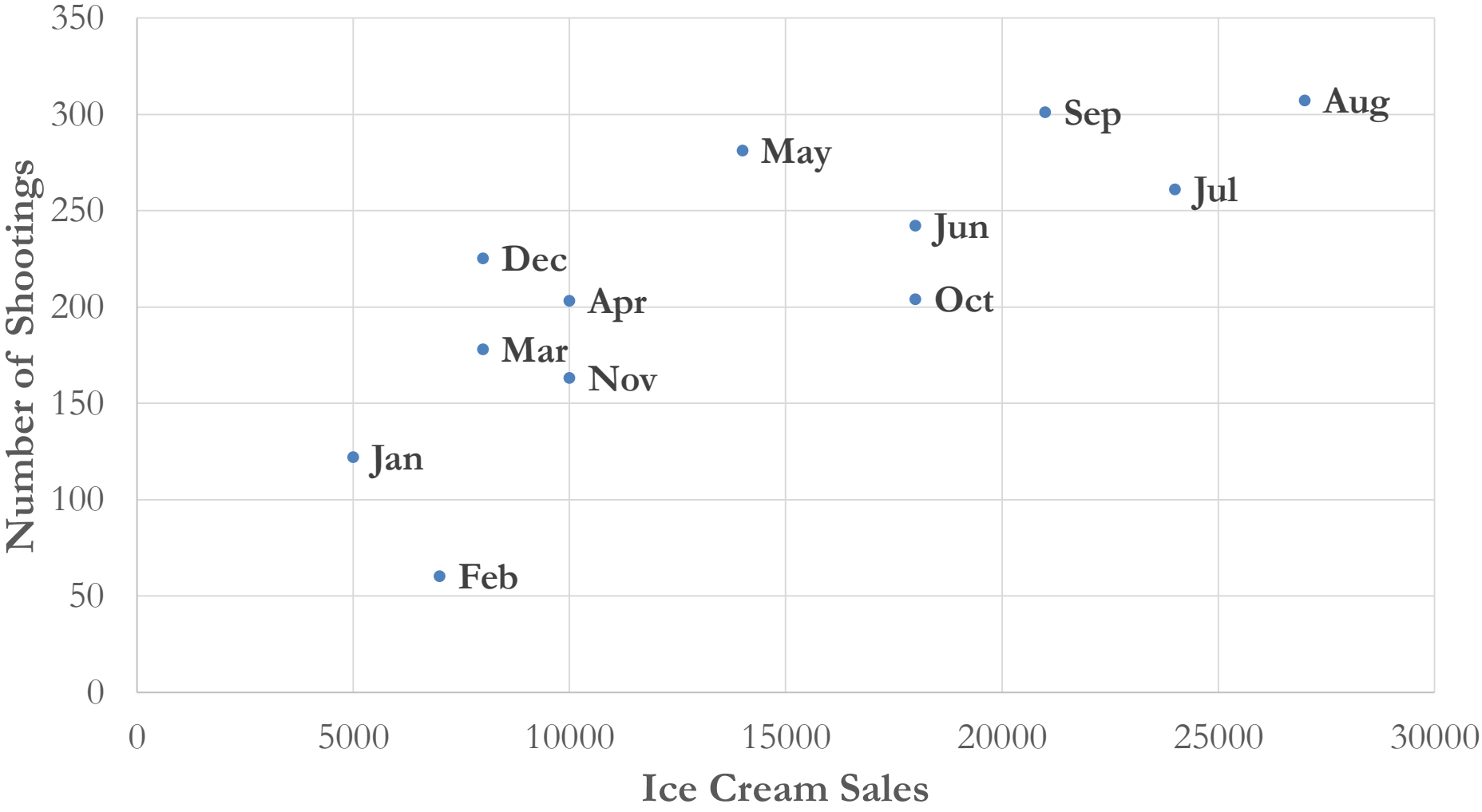
Research question: Does eating ice cream lead to aggression?

Explore relationship between ice cream sales and shootings in City X

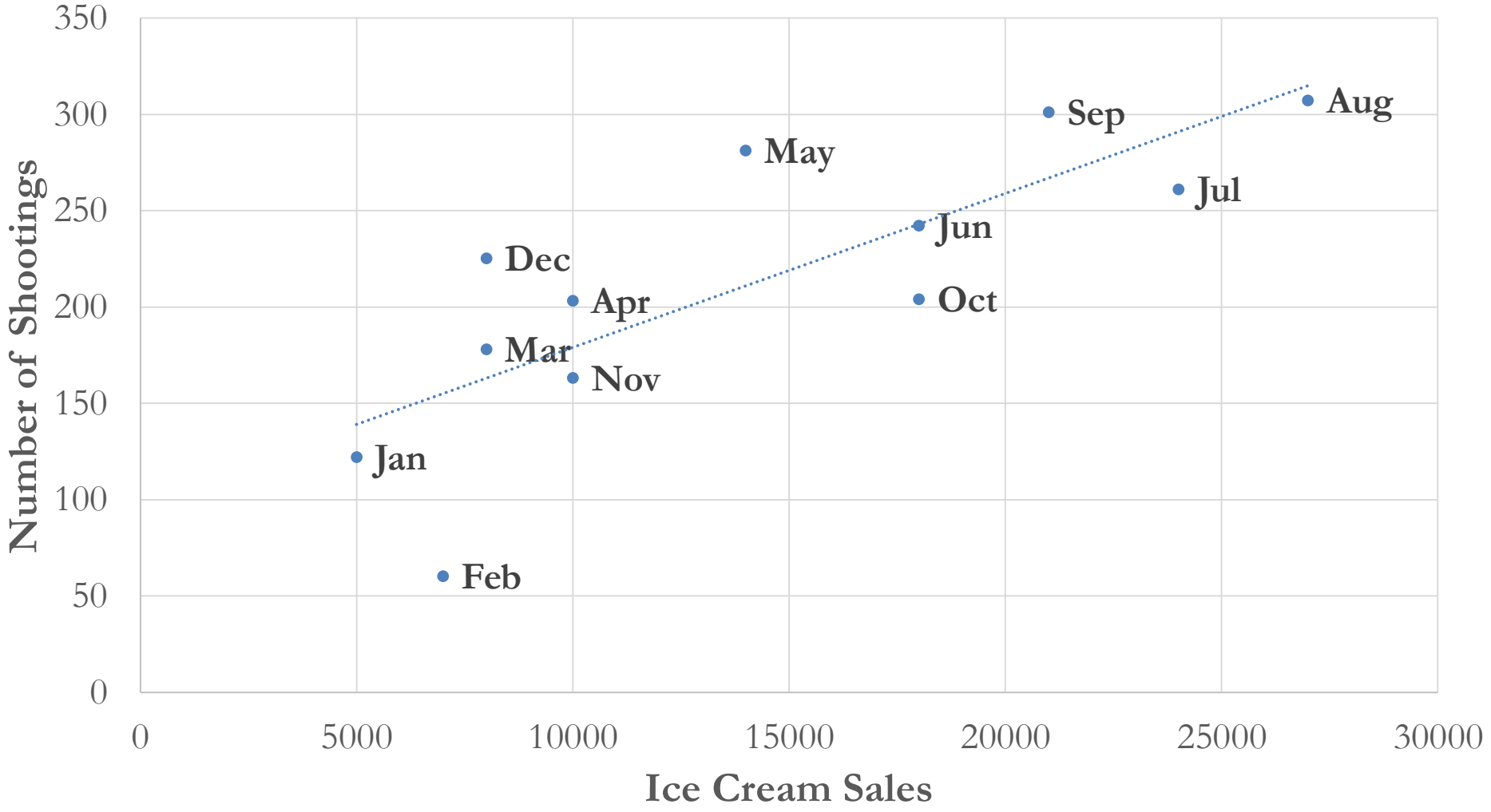
Plot monthly ice cream sales by monthly numbers of shootings

Draw inferences

Scatter Plot: Relationship Between Ice Cream Sales and Shootings



Scatter Plot: Relationship Between Ice Cream Sales and Shootings

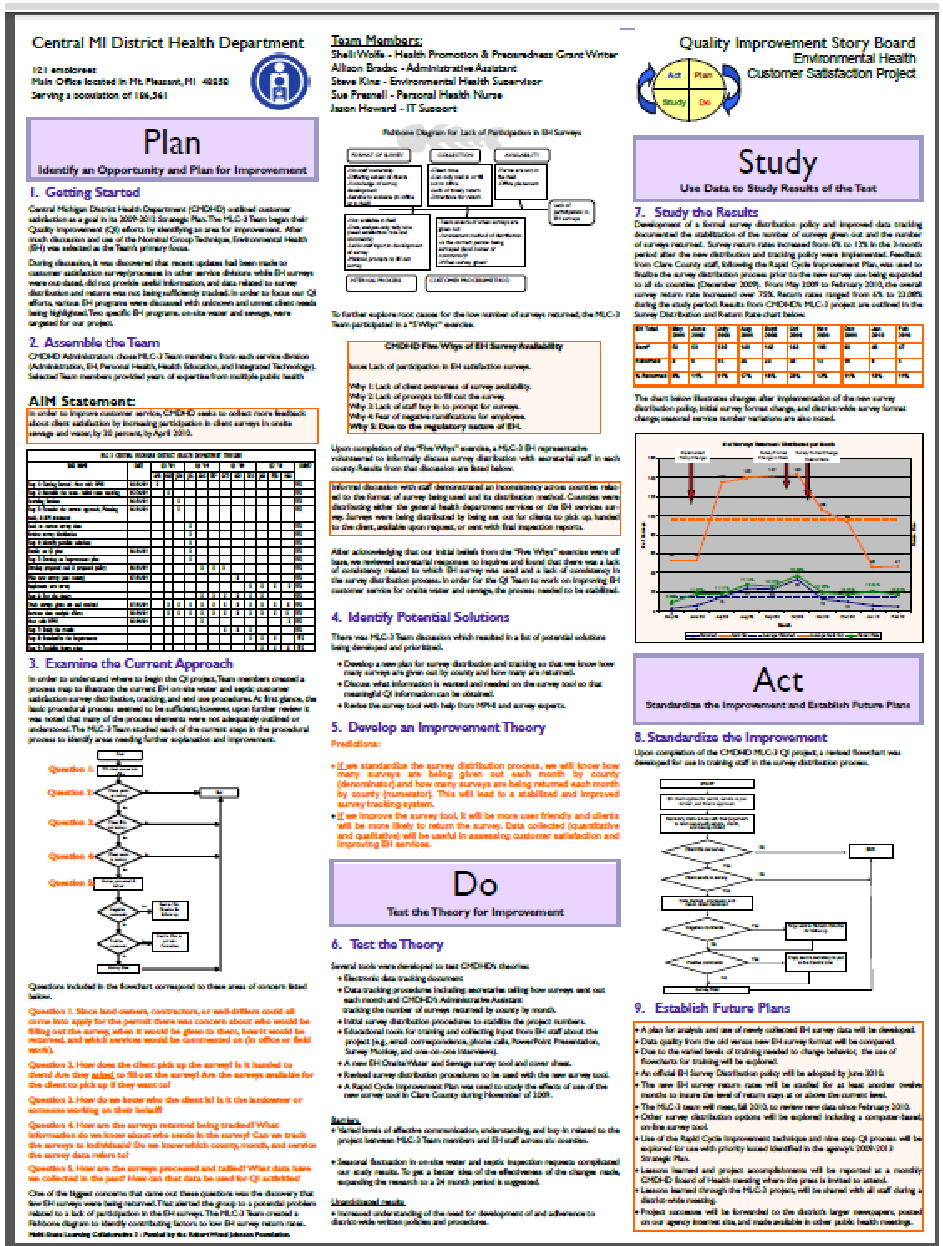


Conclusion

The more ice cream people eat, the more they shoot each other.

Ice cream sales and number of shootings are highest in hot months.

County of Los Angeles
Public Health



Central MI District Health Department

121 employees
Main Office located in Mt. Pleasant, MI 48858
Serving a population of 186,561

Team Members:
Shelli Wolfe - Health Promotion & Preparedness Grant Writer
Allison Bradac - Administrative Assistant
Steve King - Environmental Health Supervisor
Sue Presnell - Personal Health Nurse
Jason Howard - IT Support

Quality Improvement Story Board
Environmental Health
Customer Satisfaction Project

Plan
Identify an Opportunity and Plan for Improvement

1. Getting Started

Central Michigan District Health Department (CMDHD) outlined customer satisfaction as a goal in its 2009-2013 Strategic Plan. The MLC-3 Team began their Quality Improvement (QI) efforts by identifying an area for improvement. After much discussion and use of the Nominal Group Technique, Environmental Health (EH) was selected as the Team's primary focus.

During discussion, it was discovered that recent updates had been made to customer satisfaction surveys/processes in other service divisions while EH surveys were out-dated, did not provide useful information, and data related to survey distribution and returns was not being sufficiently tracked. In order to focus our QI efforts, various EH programs were discussed with unknown and unmet client needs being highlighted. Two specific EH programs, on-site water and sewage, were targeted for our project.

2. Assemble the Team

CMDHD Administrators chose MLC-3 Team members from each service division (Administration, EH, Personal Health, Health Education, and Integrated Technology). Selected Team members provided years of expertise from multiple public health

AIM Statement:

In order to improve customer service, CMDHD seeks to collect more feedback about client satisfaction by increasing participation in client surveys in onsite sewage and water, by 20 percent, by April 2010.

3. Examine the Current Approach

In order to understand where to begin the QI project, Team members created a process map to illustrate the current EH on-site water and septic customer satisfaction survey distribution, tracking, and end use procedures. At first glance, the basic procedural process seemed to be sufficient; however, upon further review it was noted that many of the process elements were not adequately outlined or understood. The MLC-3 Team studied each of the current steps in the procedural process to identify areas needing further explanation and improvement.

Question 1:
Question 2:
Question 3:
Question 4:
Question 5:

Questions included in the flowchart correspond to these areas of concern listed below.

Question 1. Since land owners, contractors, or well-drillers could all come into apply for the permit there was concern about who would be filling out the survey, when it would be given to them, how it would be returned, and which services would be commented on (in office or field work).

Question 2. How does the client pick up the survey? Is it handed to them? Are they asked to fill out the survey? Are the surveys available for the client to pick up if they want to?

Question 3. How do we know who the client is? Is it the landowner or someone working on their behalf?

Question 4. How are the surveys returned being tracked? What information do we know about who sends in the survey? Can we track the surveys to individuals? Do we know which county, month, and service the survey data refers to?

Question 5. How are the surveys processed and tallied? What data have we collected in the past? How can that data be used for QI activities?

One of the biggest concerns that came out these questions was the discovery that few EH surveys were being returned. That alerted the group to a potential problem related to a lack of participation in the EH surveys. The MLC-3 Team created a Fishbone diagram to identify contributing factors to low EH survey return rates.

Multi-State Learning Collaborative 3 - Funded by the Robert Wood Johnson Foundation.

Fishbone Diagram for Lack of Participation in EH Surveys

To further explore root causes for the low number of surveys returned, the MLC-3 Team participated in a "5 Whys" exercise.

CMDHD Five Whys of EH Survey Availability

Issue: Lack of participation in EH satisfaction surveys.

Why 1: Lack of client awareness of survey availability.
Why 2: Lack of prompts to fill out the survey.
Why 3: Lack of staff buy in to prompt for surveys.
Why 4: Fear of negative ramifications for employee.
Why 5: Due to the regulatory nature of EH.

Upon completion of the "Five Whys" exercise, a MLC-3 EH representative volunteered to informally discuss survey distribution with secretarial staff in each county. Results from that discussion are listed below.

Informal discussion with staff demonstrated an inconsistency across counties related to the format of survey being used and its distribution method. Counties were distributing either the general health department services or the EH services survey. Surveys were being distributed by being set out for clients to pick up, handed to the client, available upon request, or sent with final inspection reports.

After acknowledging that our initial beliefs from the "Five Whys" exercise were of bias, we reviewed secretarial responses to inquiries and found that there was a lack of consistency related to which EH survey was used and a lack of consistency in the survey distribution process. In order for the QI Team to work on improving EH customer service for onsite water and sewage, the process needed to be stabilized.

4. Identify Potential Solutions

There was MLC-3 Team discussion which resulted in a list of potential solutions being developed and prioritized.

- Develop a new plan for survey distribution and tracking so that we know how many surveys are given out by county and how many are returned.
- Discuss what information is wanted and needed on the survey tool so that meaningful QI information can be obtained.
- Revise the survey tool with help from MPHI and survey experts.

5. Develop an Improvement Theory

Predictions:

- If we standardize the survey distribution process, we will know how many surveys are being given out each month by county (denominator) and how many surveys are being returned each month by county (numerator). This will lead to a stabilized and improved survey tracking system.
- If we improve the survey tool, it will be more user friendly and clients will be more likely to return the survey. Data collected (quantitative and qualitative) will be useful in assessing customer satisfaction and improving EH services.

Do
Test the Theory for Improvement

6. Test the Theory

Several tools were developed to test CMDHD's theories.
- Electronic data tracking document.
- Data tracking procedures including secretaries tallying how surveys sent out each month and CMDHD's Administrative Assistant tracking the number of surveys returned by county by month.
- Initial survey distribution procedures to stabilize the project numbers.
- Educational tools for training and collecting input from EH staff about the project (e.g., email correspondence, phone calls, PowerPoint Presentation, Survey Monkey, and one-on-one interviews).
- A new EH Onsite Water and Sewage survey tool and cover sheet.
- Revised survey distribution procedures to be used with the new survey tool.
- A Rapid Cycle Improvement Plan was used to study the effects of use of the new survey tool in Clare County during November of 2009.

Barriers
- Varied levels of effective communication, understanding, and buy-in related to the project between MLC-3 Team members and EH staff across six counties.
- Seasonal fluctuation in on-site water and septic inspection requests complicated our study results. To get a better idea of the effectiveness of the changes made, expanding the research to a 24 month period is suggested.

Unanticipated results
- Increased understanding of the need for development of and adherence to district-wide written policies and procedures.

Study
Use Data to Study Results of the Test

7. Study the Results

Development of a formal survey distribution policy and improved data tracking documented the stabilization of the number of surveys given out and the number of surveys returned. Survey return rates increased from 6% to 12% in the 3-month period after the new distribution and tracking policy were implemented. Feedback from Clare County staff, following the Rapid Cycle Improvement Plan, was used to finalize the survey distribution process prior to the new survey use being expanded to all six counties (December 2009). From May 2009 to February 2010, the overall survey return rate increased over 75%. Return rates ranged from 6% to 33.08% during the study period. Results from CMDHD's MLC-3 project are outlined in the Survey Distribution and Return Rate chart below.

The chart below illustrates changes after implementation of the new survey distribution policy, initial survey format change, and district-wide survey format change; seasonal service number variations are also noted.

Act
Standardize the Improvement and Establish Future Plans

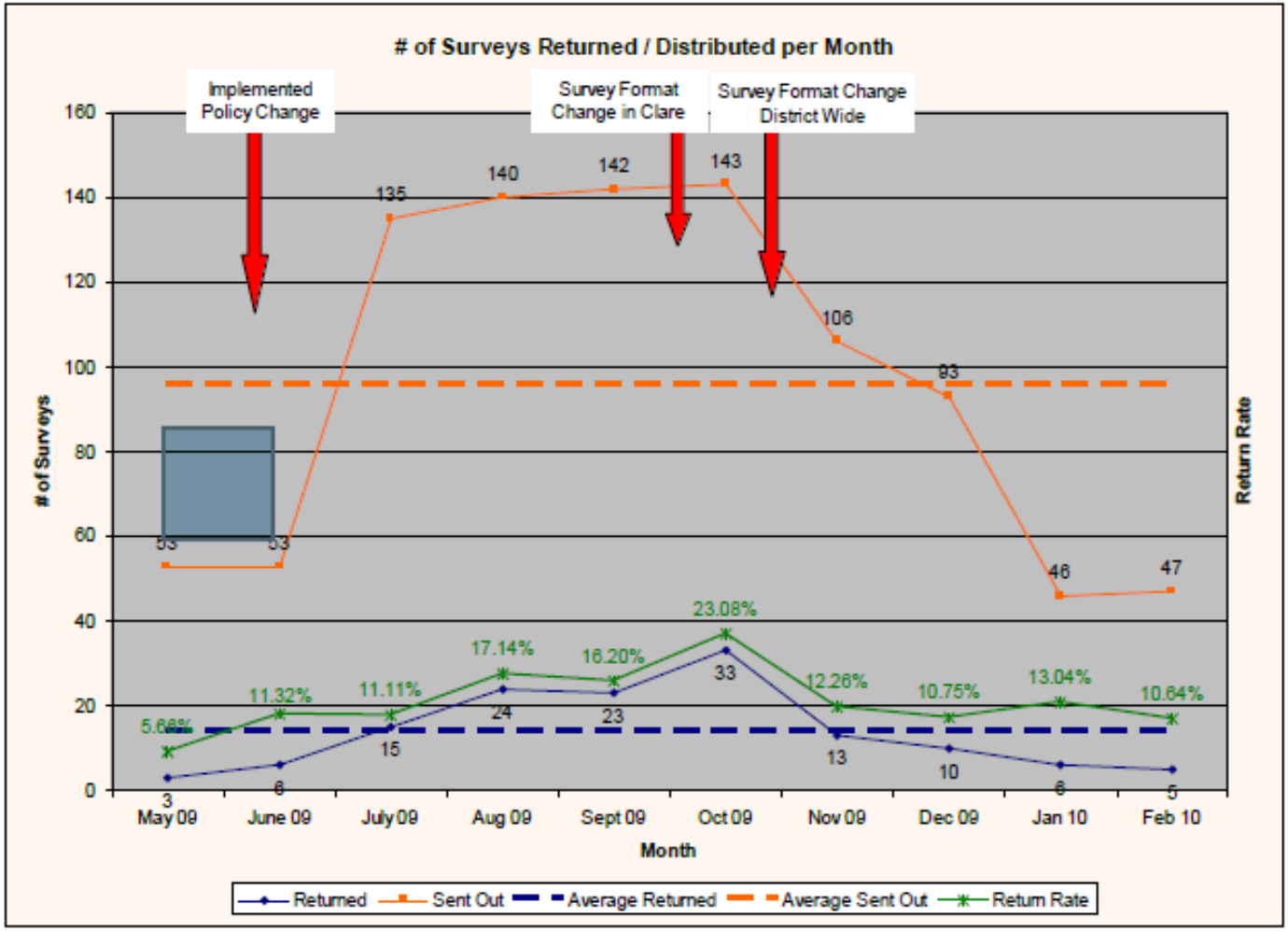
8. Standardize the Improvement

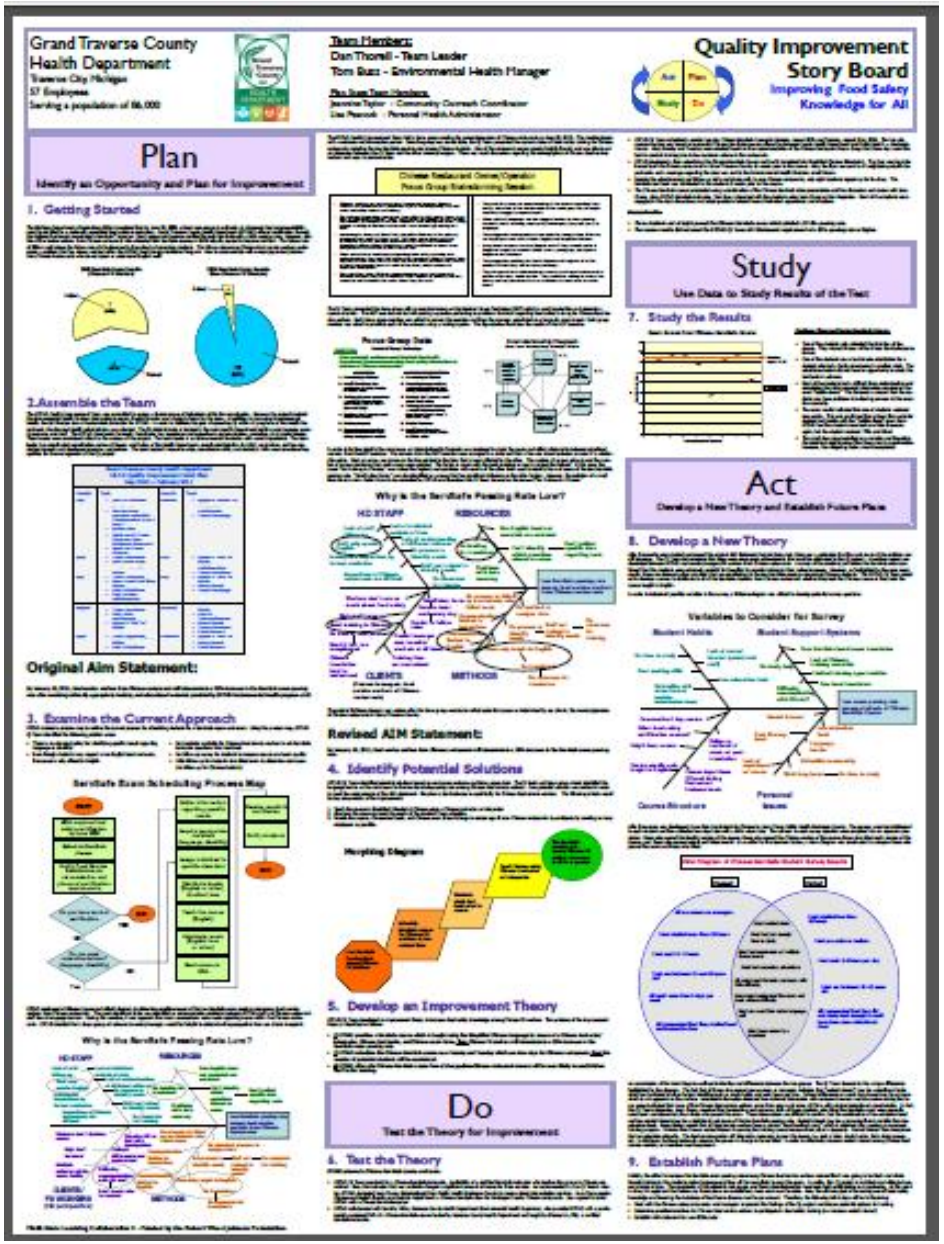
Upon completion of the CMDHD MLC-3 QI project, a revised flowchart was developed for use in training staff in the survey distribution process.

9. Establish Future Plans

- A plan for analysis and use of newly collected EH survey data will be developed.
- Data quality from the old versus new EH survey format will be compared.
- Due to the varied levels of training needed to change behavior, the use of flowcharts for training will be explored.
- An official EH Survey Distribution policy will be adopted by June 2010.
- The new EH survey return rates will be studied for at least another twelve months to insure the level of return stays at or above the current level.
- The MLC-3 team will meet, fall 2010, to review new data since February 2010.
- Other survey distribution options will be explored including a computer-based, on-line survey tool.
- Use of the Rapid Cycle Improvement technique and nine step QI process will be explored for use with priority issues identified in the agency's 2009-2013 Strategic Plan.
- Lessons learned and project accomplishments will be reported at a monthly CMDHD Board of Health meeting where the press is invited to attend.
- Lessons learned through the MLC-3 project, will be shared with all staff during a district-wide meeting.
- Project successes will be forwarded to the district's larger newspapers, posted on our agency internet site, and made available in other public health meetings.

Storyboard – Run Chart





Grand Traverse County Health Department
Traverse City, Michigan
57 Employees
Serving a population of 86,000

Team Members:
Dan Thorell - Team Leader
Tom Ruiz - Environmental Health Manager

Plus Team Members:
Jeannine Taylor - Community Outreach Coordinator
Lisa Peacock - Personal Health Administrator

Quality Improvement Story Board

Improving Food Safety Knowledge for All

Plan

Identify an Opportunity and Plan for Improvement

1. Getting Started

2.Assemble the Team

Original Aim Statement:

3. Examine the Current Approach

Why is the ServSafe Passing Rate Low?

Chinese Restaurant Owner/Operator Focus Group Stakeholding Session

Focus Group Data

Why is the ServSafe Passing Rate Low?

Revised AIM Statement:

4. Identify Potential Solutions

5. Develop an Improvement Theory

Do

Test the Theory for Improvement

6. Test the Theory

Study

Use Data to Study Results of the Test

7. Study the Results

Act

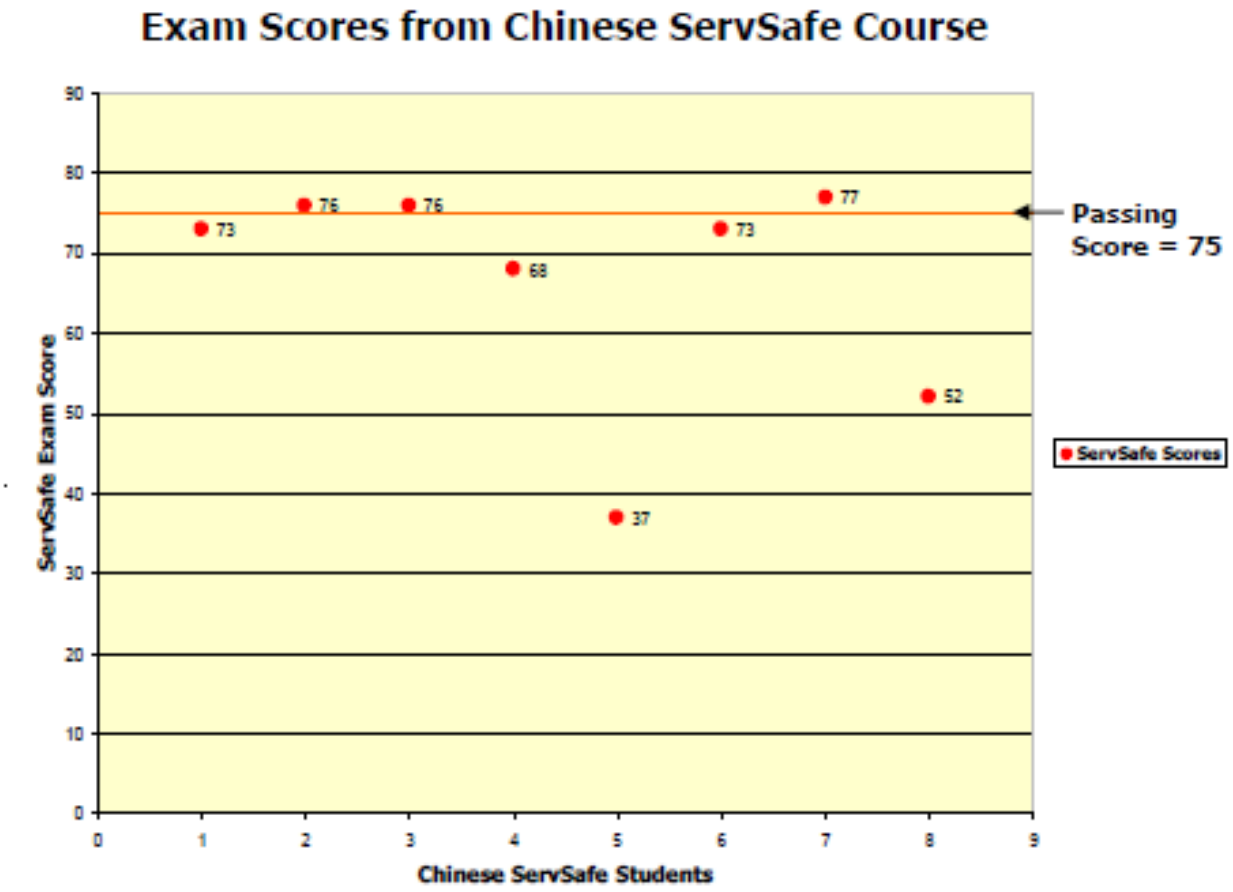
Develop a New Theory and Establish Future Plans

8. Develop a New Theory

Variables to Consider for Survey

9. Establish Future Plans

Storyboard – Scatter Diagram



Questions?

Thank you!