Activity 1: Income and Food Access[2] (*10 minutes*)

Instructional Routine: Collect and Display (MLR2)	
Building On: NC.8.SP.1	Addressing: NC.M1.S-ID.6

In this activity, students explore the question: "Does your neighborhood determine access to healthy foods?" The data set provided was collected in 2019 in grocery stores within San Antonio, TX and includes the average household income of the neighborhood and the number of organic vegetables offered at local stores. Neighborhoods were identified by zip code.

Students create a scatter plot and describe the relationship between the two variables. The data in this activity has a positive direction, meaning that as one variable increases, the other increases.

Step 1

- Keep students in pairs.

- Write the term "food desert" on the board.

- Ask the class: "What do you think the term 'food desert' means?" (A food desert is an area—neighborhood, community, etc.—where healthy, affordable food is difficult to obtain.)

- Distribute the Food Desert Statistics handout[3] and have students read it.

- Ask students to choose one of the following questions[4] to answer with their partner, discuss in partners, and then report their answer to the class:

    – Why might healthy, affordable food be difficult to obtain in certain areas?

    – In which types of areas/communities do you think food deserts are most prevalent: urban, rural or suburban? Do they only exist in those areas?

    – How do you think living in a food desert could affect a person's/family's food choices?

- Facilitate a whole-class discussion by asking students to share their or their partner's thinking about the questions. Encourage students to ask questions of each other and use the reading to support their responses.

- Revisit the data students suggested during the warm-up to address the question about access to healthy foods. Introduce the data provided on average household income and number of organic vegetables offered. Ask students:

    – "How might these data help us investigate this question?" (There needs to be a number to describe the neighborhood. This could be the average household income. Another possibility could be the population. There also needs to be a number to pair with the neighborhood that describes healthy foods. This could be organic vegetables. It could also be square footage of the produce section in the local grocery store.")

    – "What makes a vegetable 'organic'?" (Organic foods are grown without pesticides or certain fertilizers.)

    – "What concerns might you have about using these data?" (Vegetables do not have to be organic to be healthy. This narrow definition of "healthy foods" should be considered when making any conclusions from the analysis of the data.)

Step 2

- Provide students with a computer and access to Desmos. The Activity 1 data set is provided in the spreadsheet referenced in the Lesson Narrative to allow students to copy and paste the data.

- Provide students with a couple of minutes to individually create the scatter plot and then ask that they work with their partner to create a description of the relationship.

- Using the *Collect and Display* routine, listen for and scribe the language students use to describe the relationship between the two variables as they work. Be prepared to display students' words and phrases in Step 3.

> **(M)** **Monitoring Tip:** Identify descriptions that vary in precision from the general to the more specific.
> - It goes up.
> - It goes up when the income goes up.
> - As the income increases, the number of organic vegetables offered increases.
> - The number of organic vegetables offered increases as the income increases. Once over $100,000, the number is mostly constant at 95 items.

Student Task Statement

"Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (World Food Summit, 1996).

Students at a high school in San Antonio, TX decided to explore the access to healthy food items available at grocery stores in different neighborhoods. They decided to collect data on the average household income for the neighborhood (defined by zip code) and the number of organic items available in the local grocery store.

Average household income	Number of organic vegetables offered	Average household income	Number of organic vegetables offered
$71,186	36	$50,252	65
$34,234	4	$53,945	50
$71,186	28	$59,072	35
$48,760	31	$49,437	36
$78,096	78	$72,080	28
$40,506	14	$108,486	95
$38,166	12	$70,530	46
$50,398	18	$57,199	29
$49,437	38	$78,176	73
$66,073	84	$78,288	53
$86,566	61	$86,566	86
$78,176	56	$84,181	68
$59,154	62	$84,181	56
$50,252	44	$78,176	85
$48,364	26	$84,181	86
$56,274	29	$135,547	93
$41,318	15	$92,946	82
$125,145	95	$77,894	96
$65,911	18		

1. Create a scatter plot to display the (*average household income, number of organic vegetables offered*).

   a. In www.desmos.com/calculator, click on the + icon on the top left of the window. Select the table option.

   b. Copy the data set provided at bit.ly/U4L1DataSet and paste into the first entry line in Desmos.

   c. As you enter, coordinate pairs will be plotted on the graph. If needed, adjust the graphing window to see the plotted points. Use the magnifying glass located below and to the left of the table to "zoom fit" the graph settings to the data.

2. Describe the relationship between the (*average household income, number of organic vegetables offered*).

3. Why are these data important to understand? Do you think a similar trend exists in other cities? Why or why not?

Are You Ready For More?

Students in Charlotte, NC were interested in examining the access in their city. They collected the following data. In this case, they also collected the population within the neighborhood (defined by zip code).

1. Create a scatter plot for the (*median household income, organic produce available*) and describe any relationship between the two variables.

2. Compare this relationship to the one you found for San Antonio. What do you think are the reasons for any similarities or differences?

3. Create a scatter plot for the (*population, organic produce available*) and describe any relationship between the two variables.

4. One of the points appears to be an outlier. How does your answer to question 3 change if the outlier is removed?

Population	Median household income (2019)	Number of organic produce available
71048	65963	27
59664	93942	40
49635	59438	43
9280	136333	44
53629	51676	44
37286	91494	44
37309	45808	46
11315	88039	47
11195	92786	55
43931	52766	55
42263	71914	55
19283	93938	56
28523	90057	57
20317	76022	58
47208	49465	59

Step 3

- Display the scatter plot for all to see.

- Select students to briefly share their responses.

- To help students see the connection between their descriptions, refer to a display of any student words and phrases collected as they worked. Use arrows or annotations to highlight connections between specific descriptions such as how "up" connects to "increases" and "it" refers to average household income or number of organic vegetables.

- Facilitate a discussion on the direction of data as displayed in a scatter plot.

  – Display the scatter plot from the warm-up on the *absences* and *grade* alongside the scatter plot for *average household income* and *number of organic vegetables*.
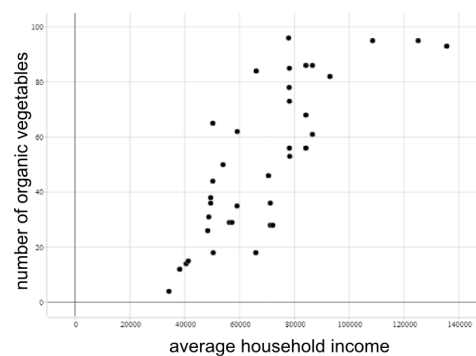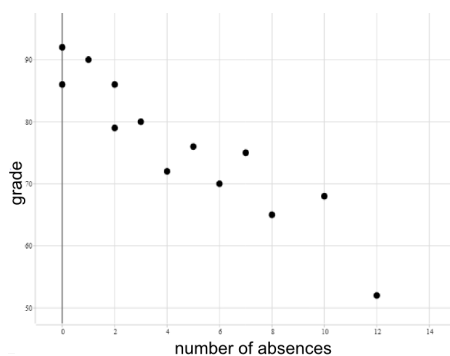
  – Ask students: "What is the direction of the relationship in each scatter plot?" (up, down, increasing, and/or decreasing)

    ○ What does this relationship indicate about food deserts in San Antonio, Texas?

  – Connect scatter plots, student language, and descriptions with the vocabulary of:

    ○ positive direction: as one variable increases, the other variable increases

    ○ negative direction: as one variable increases, the other variable decreases

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Food Desert Statistics

Obesity is a big problem in the United States. Studies show that certain racial groups are more affected by obesity than others. These problems may be worse in certain communities because access to affordable and nutritious food is difficult. This is especially true for those living in low-income communities of color and rural areas with limited access to grocery stores. These areas are often called "food deserts."

Residents of food deserts may rely more on convenience stores and fast food restaurants since access to grocery stores is limited. These convenience stores and fast food restaurants don't typically sell the variety of foods needed for a healthy diet such as fresh fruits and vegetables, whole grains, fresh dairy and lean meat products. If they do sell them, they often cost more than they cost at grocery stores. This puts those who live in food deserts at a financial and nutritional disadvantage.

Studies show that:
- Of all U.S. households, 2.3 million (2.2 percent) live more than a mile from a supermarket and do not have access to a vehicle. An additional 3.2 percent live between a half-mile to a mile from a supermarket with no vehicle access.

- 23.5 million people live in low-income areas more than one mile from a supermarket.

- Low-income census tracts have half as many supermarkets as wealthy tracts.

- 8 percent of African Americans live in a census tract with a supermarket, compared to 31 percent of whites.

- Low-income zip codes have 30 percent more convenience stores, which tend to lack healthy items, than middle-income zip codes.

- Residents in 20 percent of rural counties live more than 10 miles from a supermarket.

- For every additional supermarket in a census tract, produce consumption increases for 32 percent of African Americans and 11 percent of whites.

Sources:

"Access to Affordable and Nutritious Food: Measuring and Understanding Food Deserts and their Consequences:" Report (2009) to Congress from the United States Department of Agriculture.

"The Grocery Gap: Who Has Access to Healthy Food and Why It Matters:" Report from Policy Link and the Food Trust.