Probability and Covid-19

Los Angeles County announced data regarding the Mortality Rates by Ethnicity on June 20, 2020. The tables below illustrate a one day event and the cumulative up-to-date totals. You can read about this information at the Los Angeles County Public Health website.

County of Los Angeles Public Health

The following tables were created using information from this Press release as an exercise in working with Probability concepts.

Probability of an event E

$$P(E) = \frac{n(E)}{n(S)}$$

Complement Rule for Probability

$$P(non\ E) = 1 - P(E)$$

Addition Rule for Probability

$$P(E\ or\ F) = P(E) + P(F) - P(E\ and\ F)$$

Covid-19 Mortality Table (One Day Total on June 25, 2020)

Age (years)	number
18 to 40	1
41 to 65	8
65 or older	31
Total	40

If you select a person at random, what's the probability the person is: **Approximate to the Thousandths**

1. 18 to 40 years?
2. 41 to 65 years?
3. 65 or older?
4. Not 18 to 40 years?
5. Not 41 to 65 years?
6. Not 65 or older?

- Which age group is more likely to die from Cobid-19? Explain why?
- Which age group is less likely to die from Covid-19? Explain why?

Covid-19 Mortality Table (Running Total as of June 25, 2020)

Ethnicity	number
Latino/Latinx	1396
White	909
Asians	552
African American/Black	357
Native Hawaiian/Pacific Islander	10
Other	22
Total	3246

If you select a person at random, what's the probability the person is: **Approximate to the Thousandths**

7. Latino/Latinx?
8. White?
9. Asian?
10. African American/Black?
11. Native Hawaiian/Pacific Islander?
12. Other?
13. Non-Latino/Latinx?
14. Non-White?
15. Non-Asian?
16. Non-African American/Black?
17. Non-Native Hawaiian/Pacific Islander?

- Which ethnic group is more likely to die from Covid-19? Explain why?
- Which ethnic group is less likely to die from Covid-19? Explain why?

18. Latino/Latinx **or** African American/Black?
19. White **or** Asian?
20. Asian **or** Native Hawaiian/Pacific Islander?

Probability and Diabetes

The following table was gathered from the National Diabetes Statistics Report, 2020 from the Center of Disease Control. We have some important definitions to consider in using this information.

National Diabetes Statistics Report 2020

Definition- Incidence- New cases of Diabetes

Definition- Prevalence Existing cases of Diabetes

Definition- Type 1 Diabetes- People who do not produce Insulin or very little.

Definition- Type 2 Diabetes- People who do not respond to insulin as well as they should and later often do not produce enough insulin.

Definition -Insulin- Hormone that helps blood sugar (glucose) enter cells to produce energy.

I will summarize some key findings from this report.

- 34.2 Million Americans (just over 1 in 10) have Diabetes
- 88. Million Adults (approximately 1 in 3) have Pre-diabetes.
- New Diabetes cases were higher among non-Hispanic Blacks and people of Hispanic origin versus Non-Hispanic Asians and Non-Hispanic Whites.
- New cases of type I and type 2 have significantly increased among US youth.
- For ages 10 to 19 years, incidence of type 2 Diabetes remained stable among non-Hispanic Whites and increased for all others, especially non-Hispanic Blacks.
- Most people are developing type 1 and type 2 Diabetes during youth, and racial and ethnic minorities continue to develop type 2 Diabetes at higher rates.

The following is a table created illustrating the results of the CDC report on the number of existing Diabetes cases with the number of undiagnosed cases for Diabetes. The table is illustrated below and everyone in the table has Diabetes (either type I or type 2).

Age versus Diagnosis Type

Age	Diagnosed Diabetes	Undiagnosed Diabetes	Total
18 to 44	30	11	41
45 to 64	138	36	174
65 or older	214	54	268
Total	382	101	483

If you select a person from this table at random, what's the probability the person: **Approximate to the Thousandths**

21. Is aged 18 to 44 years?
22. Is aged 45 to 64 years?
23. Is aged 65 **or** older?
24. Was Diagnosed with Diabetes?
25. Was undiagnosed with Diabetes?
26. Is aged 18 to 44 **or** 65 or older?
27. Is not aged 45 to 64 years?
28. Is 18 to 44 **and** was diagnosed with Diabetes?
29. Is 18 to 44 **or** was diagnosed with Diabetes?
30. Is 45 to 64 years **and** was undiagnosed with Diabetes?
31. Is 45 to 64 years **or** was undiagnosed with Diabetes?

The following is a table created illustrating the results of the CDC report on the number of existing Diabetes cases with the number of undiagnosed cases for Diabetes. The table is illustrated below and everyone in the table has Diabetes (either type I or type 2).

Sex versus Diagnosis Type

Sex	Diagnosed Diabetes	Undiagnosed Diabetes	Total
Men	110	31	141
Women	95	25	120
Total	205	56	261

If you select a person at random, what's the probability the person: **Approximate to the Thousandths**

32. Is a man?
33. Is a woman?
34. Was diagnosed with diabetes?
35. Was undiagnosed with diabetes?
36. Man **or** a Women?
37. Man **and** a Women?
38. Man **and** was diagnosed with diabetes?

39. Man **or** was diagnosed with diabetes?
40. Woman **and** was diagnosed with diabetes?
41. Woman **or** was diagnosed with diabetes?
42. Man **and** was undiagnosed with diabetes?
43. Man **or** was undiagnosed with diabetes?
44. Women **and** was Undiagnosed?
45. Woman **or** was Undiagnosed?

The following is a table created illustrating the results of the CDC report on the number of existing Diabetes cases with the number of undiagnosed cases for Diabetes. The table is illustrated below and everyone in the table has Diabetes (either type I or type 2).

Race/Ethnicity versus Diagnosis Type

Race-Ethnicity	Diagnosed Diabetes	Undiagnosed Diabetes	Total
White (non-Hispanic)	94	25	119
Black (non-Hispanic)	133	30	163
Asian (Non-Hispanic)	112	46	158
Hispanic	103	35	138
Total	442	136	578

If you select a person at random, what's the probability the person: **Approximate to the Thousandths** Is White (non-Hispanic)?

46. Is Black (non-Hispanic)?
47. Is Asian (non-Hispanic)?
48. Is diagnosed with diabetes?
49. Was undiagnosed with diabetes?
50. Is White (non-Hispanic) **or** was undiagnosed with diabetes?
51. Is Black (non-Hispanic) **or** was undiagnosed with diabetes?
52. Is Asian (non-Hispanic) **or** was diagnosed with diabetes?
53. Is Hispanic **or** was diagnosed with diabetes?
54. Is White (non-Hispanic) **or** was undiagnosed with diabetes?
55. Is Black (non-Hispanic) **or** was undiagnosed with diabetes?
56. Is Asian (non-Hispanic) **or** was diagnosed with diabetes?
57. Is Hispanic **or** was diagnosed with diabetes?

The following is a table created illustrating the results of the CDC report on the number of existing Diabetes cases with the number of undiagnosed cases for Diabetes. The table is illustrated below and everyone in the table has Diabetes (either type I or type 2).

Race/Ethnicity versus Diagnosis Type

Education	Diagnosed Diabetes (thousandths)	Undiagnosed Diabetes	Total
Less than High School	127	39	166
High School	97	30	127
More than High School	83	22	105
Total	307	91	398

If you select a person at random, what's the probability the person: **Approximate to the Thousandths**

58. Has less than a High School education?
59. Has a High School education?
60. Has more than a High School education?
61. Was diagnosed with diabetes?
62. Was undiagnosed with diabetes?
63. Has a High School education **or** was diagnosed with diabetes?
64. Has a High School education **or** was undiagnosed with diabetes?