IN-VITRO FERTILIZATION (IVF) LIVE BIRTH SUCCESS RATES

Due to a woman's fertility declining with age, more and more women are seeking Assisted

Reproductive Technology (ART) to assist them with becoming pregnant and starting a family.

Choosing a clinic with the highest success rates of live births can be a daunting task. The

Centers for Disease Control and Prevention (CDC) requires IVF clinics that use ART to submit

statistical data including, but not limited to, many different variables to assist patients in

choosing the clinic that best meets their needs. Some of the variables included are: "Age of

Woman", "Fresh Embryos from Nondonor Eggs" (women using their own eggs), "Frozen

Embryos from Nondonor Eggs" and "Donor Eggs". For the purposes of this research paper, we

will compare the percentage of IVF cycles resulting in live births using "Nondonor Eggs" by

"Age of Woman" for three IVF clinics.

METHOD

The report provided by the Centers for Disease Control and Prevention (CDC) showed no raw

data (population size, sample size, sample means or standard deviations, etc.) so therefore it is

not necessary to apply a statistical formula to determine the end result. The computations were

already provided and are based on a 95% confidence interval derived from the percentage of IVF

cycles resulting in live births by age group in 2009. The following data provided are from the

CDC and from clinics submitting data from 2009. The data (in percentages) for each clinic is as

follows (Centers for Disease Control and Prevention [CDC], 2011):

Age of Woman

	<35	35-37	38-40
ClinicA	**34.2**	**40.9**	**32.5**
(Confidence interval)	(25.7-43.5)	(26.3-56.8)	(18.6-49.1)
ClinicB	**46.7**	**30.5**	**21.7**
(Confidence interval)	(42.0-51.4)	(25.5-35.8)	(17.8-26.2)
ClinicC	**21.1**	**20.0**	**14.3**
(Confidence interval)	(13.2-31.0)	(10.0-33.7)	(6.7-25.4)

It is important to point out that some of the weaknesses found in the data provided did not give any specifics about the women studied such as: if they had any illnesses, what is their current living environment, or if they already had previous pregnancies resulting in live births without using ART. These characteristics could have a huge impact on the outcome of the results.

RESULTS

By looking at the percentages given for each clinic by age group and without making any true analysis (that is not taking the 95% confidence interval into consideration) we can *assume* that ClinicB for the age group of <35 has the highest successful IVF cycles resulting in live births at 46.7%; ClinicA for the age group of 35-37 has the highest successful IVF cycles resulting in live births at 40.9% and again ClinicA for the age group of 38-40 has the highest successful IVF cycles resulting in live births at 32.5%. Which clinic appears to be the most successful? Once we consider the 95% confidence interval, the results may or may not be different. Below is the data for each clinic and my statistical interpretation.

ClinicA – Although ClinicA has the highest percentages for age groups: 35-37 and 38-40 the confidence interval is wide (the difference between the lower and upper bound for each age

group is: **17.8**, **30.5** and **30.5,** respectively) which indicates a small sample size for each age group. Each percentage falls into the confidence interval of the previous group which tells us that there is no real difference of success rates between age groups; therefore, the percentage computed may not be precise.

ClinicB – Even though ClinicB has live births success rates lower than ClinicA for age groups 35-37 and 38-40, the confidence interval range for each age group is small (**9.40, 10.3** and **8.40**, respectively) which indicates a larger sample size was used and gives a more accurate percentage. This means that we are 95% confident that the percentages derived for each age group is precise.

ClinicC – Overall ClinicC has the lowest live births success rates across all three clinics for all age groups and with a wide confidence interval for each age group (**17.8, 23.7** and **18.7,** respectively). This tells us that they also used a small sample size to derive the percentages for IVF cycles resulting in live births, but those percentages are not as accurate as compared to ClinicB.

DISCUSSION

Based on my analysis of the data provided and interpreted, ClinicB shows to have the highest success rates of IVF cycles resulting in live births. Even though their pecentages were close to those of ClinicA, the 95% confidence interval was smaller indicating a larger sample size and therefore provided more accurate percentages leading to higher success rates of IVF cycles resulting in live births.

An article published by the New England Journal of Medicine, 2009, provided raw data including some of these characteristics studied from a larger center in Boston. Their results were

the following, "Among 6164 patients undergoing 14,248 cycles, the cumulative live-birth rate after 6 cycles was 72% (95% confidence interval [CI], 70 to 74)[…] Among patients who were younger than 35 years of age, the corresponding rates after six cycles were 86% (95% CI, 83 to 88)[…]" (New England Journal of Medicine, 2009) The small confidence interval show 95% confidence that the percentages are true and precise.

For a future study, I would like to do a comparison of different age groups of women in the U.S. to women in Europe for IVF cycles resulting in live births using Nondonor Eggs from a *cumulative* perspective and using raw data rather than percentages of IVF cycles using ANOVA to compare the means of several groups. An article published by Human Reproduction says that "cumulative pregnancy rates (CPRs) and live birth rates (CLBRs) are much better indicators of success in IVF programmes than cross-sectional figures per cycle or embryo transfer. They allow a better estimation of patient's chances of having a child and enable comparisons between centres and treatment strategies." (Human Reproduction, Vol.26, No.8 pp. 2239–2246, (2011). Without closely analyzing the data, it is easy to confuse the high percentages with high success rates. All data should be taken into consideration including unknown parameters. For example, most of the information found during this research provided no real data for women over the age 44 which leads to the question: Are IVF clinics intentionally omitting certain kinds of data to improve their success rates?

REFERENCES

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