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FOUNDATION FOR CYSTIC FIBROSIS SUPPORT®

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An Exploratory Data Analysis:

Quantifying the Impact of the Claire's Place Foundation on the Cystic Fibrosis (CF) Community

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Link: https://drive.google.com/file/d/1UgNrMceWsYfGH7vCMdd-fJ4wg4AODttj/view?usp=sharing

Executive Summary

This report presents key insights to highlight, quantify, and illustrate the remarkable impact and influence of the Claire's Place Foundation on its beneficiaries and the broader cystic fibrosis (CF) community. Our goal is to break down and derive tangible, data-oriented recommendations to support the foundation's inspiring mission. At a high level, the data has shown us three of the most fundamental discoveries on the impact the foundation has had on the CF community: 1) over 50% (~$183,000) of total grants given to families with CF came from only five states, California, Florida, Texas, Georgia, and Ohio; 2) only less than 40 of the 172 unique applicants had a negative difference of the amount requested and amount granted that averaged -$1949; and lastly, 3) the Claire's Place Foundation has made a predominate impact on the most vulnerable members of the cystic fibrosis community–low and medium income adolescents needing financial support to afford their rent and mortgage payments.

Before expanding on our observations further, it will be best to explain our team's additions to the existing data. In hopes of exploring the variation across age, income, and household groups our team decided on mutating these variables to assist in our visualizations. All of these mutations were carefully considered by analyzing the quantile ranges and evaluating the plausibility of these categories. Please reference our appendix to see in more detail the rationale behind these mutations.

Now having explained the revisions made to our data set, we will explore the first conclusion: more than 50% of total grants and over 100 applications came from only five of the thirty-four states. More specifically, our team created a tibble grouped by states of average grants, number of applications, and total impact, which formula is average grants times number of applications. We found that California and Florida had generated $53,041 and $52,817, respectively. On their own accord, these two states account for more than 25% of total grants. The remaining top three states, Texas, Georgia, and Ohio, each averaged ~$25,000 in total grants. Our team began using more complex methods to extract data from these rudimentary findings. We began with an interactive linear regression of our dependent variable, the amount granted, and two independent variables, the amount requested and the age category. Not only was the model significant, but it also had an Adjusted R-squared value of .3.

In other words, the amount granted can be well explained by the applicant's requested amount and age category. The impact of the model suggests that the amount granted for adolescents is less than adults in terms of intercept, but they have a slope 10-fold than that of adults. Thus, at the point where the amount requested equals 1796, adolescents receive more grants than adults on average. However, while adolescents did receive more grants on average by a marginal amount, we found that the amount requested for adults is significantly higher than for adolescent patients. We generated a null hypothesis that, on average, adult patients have the same amount requested as minors and an alternative suggesting adults have a higher amount requested. We reject the null hypothesis in favor of the alternative, implying

that adults have higher needs than minor patients (observed statistic 579.4, the p-value for 5000 replicates was .0438, and the confidence interval is from -44 to 1378).

Secondly, our team found that of the 172 unique applicants, only 40 received amounts less than their total request, and 21 applicants received grants surpassing their total amount requested. It should also be noted that there were two extreme outliers in the 40 applicants who received amounts less than their total request: one individual had requested over $32,000, and the other had requested over $28,000 (14 times more than the average). When we visualized the difference via a scatter plot, we found that most of the data fitted our horizontal line at 0 with a small spread above and below this threshold, meaning positive and negative differences in amounts granted. This suggests that the Claire's Place Foundation has been meeting and even at times exceeding the amount requested for applicants in the cystic fibrosis community. The negative difference in amounts granted can be explained by average requests. That is, the difference becomes more negative for every unit increase in the average request. We verified this claim by doing an interactive linear regression of our dependent variable "difference" over average requests and age category. Not only was the model significant, but the Adjusted R-squared was .73. Therefore, we can say that the explanatory variables explain the variation in the dependent variable.

Lastly, the Claire's Place Foundation has had a lasting impact on the most vulnerable populations in the CF community. We found that the foundation has donated approximately $100,000 to those in the low-income branch ($0-$25,000). Even more so, these donations were sustainable in that they covered predominantly rent, electric, and mortgage expenses. The middle-income group, generating a total of $82,000 in grants. Unfortunately, we are unable to identify the exact income of those who responded "N/A," which received over $145,000 in grants. Nonetheless, based on the trends of the low-income group that used a majority of grants on rent, we assume these individuals fall within the same category.

While the data provided allowed us to conduct and quantify the tremendous work of the Claire's Place Foundation, we would like to spend a brief time expanding on future recommendations for data collection. For the WPP program, it would be helpful to see how the funds are broken down similarly to the Category variable to tailor our recommendations—for example, showing if those funds are going to upskilling, equipment, or job training. Secondly, we believe the Claire's Place Foundation should adopt a numeric, quantitative-focused feedback system in addition to anecdotes. By adopting both quantitative and qualitative responses from applicants, the foundation will appeal to its stakeholders' emotions and logic. Lastly, incorporating volunteer conversion rates (i.e., donations, becoming a corporate partner, or any other call-to-action) into the data will help measure the support the foundation is receiving. Overall, the Claire's Place Foundation has made and continues to make sustainable changes for the most vulnerable families fighting cystic fibrosis every single day. As highlighted through this report, Claire’s love and vision continues to live on, inspiring and supporting many in the CF community and even within the USC community.