Fetal Curve Study Analysis Report

Principal Investigator: Tom Greene

Statistician: Sergazy Nurbavliyev

2019-12-10

Table of Contents

author: - “Principal Investigator: Tom Greene” - “Statistician: Sergazy Nurbavliyev” date: “2019-12-10” output: word_document: reference_docx: Report_Template1.docx toc: TRUE

Log

- This is the first version of analysis report sent to PI:
  - Dataset used is “Utah.Fetal.Growth.Curve.Analysis.Data.for.Statistical.Practice.Class.csv”;
  - SAP used to generate report is “UFGC_SAP_November_31.docx”;

- Time used for this project until now is 15 hours.

Abstract

We have analyzed growth curve pattern. It will be safe to say having higher gestational age may lead to have higher birth weights. We have also found that among term deliveries (Age ≥ 38 weeks), birthweights are associated with parity after accounting for other maternal characteristics and gestational age.

Data

- Version of data: This data is provided by the PI Tom Greene and there are 284168 total observations included;
- Exclude id variable, and exclude birth year variable.
- We have filled missing values with 0's in BPRETERM, BDEPRESS and BBIPOLAR.
- We have replaced 1's with Yes's and 0's with No's in BPRETERM, BDEPRESS and BBIPOLAR.
- Variable definitions: Outcome is "birth_weight" (Birth Weight in Grams), other variables used for analysis are BGENDER, BMOMAGE, BPRETERM, BDEPRESS, BBIPOLAR, gestational_age, hispanic, race, parity, mom_height_inches, mom_weight_previous;
- Cohort construction:

Cohort Construction

Criteria	Size
Total number of observations	284168

Statistical Methods

We have used quantile regression with different percentiles and b-spline method to fit the curves. For sensitivity analysis we have used natural spline method to fit the growth curves. We have also used mean regression and compare the results with other quantile regressions.

Research Objectives

- Estimate Utah-specific birth weight quantiles as a function of gestational age (weeks) by gender Specifically, we want quantiles (3^{rd}, 5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}, 95^{th}, and 97^{th}).
- Among term deliveries (Age ≥ 38 weeks), birthweights are associated with parity after accounting for other maternal characteristics such as BMOMAGE, BPRETERM, BDEPRESS, BBIPOLAR, birth_weight, gestational_age, hispanic, race, parity, mom_height_inches, mom_weight_previous and gestational age.

Result

Tables

Table 1. Descriptive Summary

Variable	Levels	Summary (N=284168)	#Missing
Gender of baby	F	138558 (48.8%)	0
	M	145610 (51.2%)	0
Mom's age (years)	Mean (SD)	28.0 (5.1)	12
	Median (IQR)	28.0 (24.0, 31.0)	-
	Range	(18.0, 56.0)	-
Preterm	Yes	14303 (5%)	0
Depression	Yes	17356 (6.1%)	0
Bipolar	Yes	911 (0.3%)	0
Birth weight	Mean (SD)	3338.8 (480.5)	0
	Median (IQR)	3346.0 (3057.3,	-
	Range	(325.0, 6261.1)	-
Gestational age (weeks)	Mean (SD)	38.7 (1.5)	0
	Median (IQR)	39.0 (38.0, 39.0)	-
	Range	(24.0, 42.0)	-
Hispanic	Hispanic	42746 (15%)	0
	Non-Hispanic	235050 (82.7%)	0
	Unknown/Missing	6372 (2.2%)	0
race	Asian	2335 (0.8%)	0
	Black	3201 (1.1%)	0
	Missing	5 (0%)	0
	Other	32852 (11.6%)	0
	White	245775 (86.5%)	0
parity	Mean (SD)	1.4 (1.4)	364
	Median (IQR)	1.0 (0.0, 2.0)	-
	Range	(0.0, 17.0)	-
Mom's height (inches)	Mean (SD)	64.9 (2.8)	3453
	Median (IQR)	65.0 (63.0, 67.0)	-
	Range	(48.0, 83.0)	-
Mom's weight (lb)	Mean (SD)	149.1 (35.0)	4314
	Median (IQR)	140.0 (125.0, 165.0)	-
	Range	(65.0, 425.0)	-

Table 2. Regression Results for crude model to see the association for Females and Males

Variable	M1 for Females - Coefficients (95% CI)	M1 - p	M2 for Males - Coefficients (95% CI)	M2 - p
(Intercept)	-3527.1 (-3602, -3269.5)	<0.001	-3794.2 (-3884.83, -3654.15)	<0.001
Gestational age	175.17 (170.92, 178.16)	<0.001	185.7 (182.77, 188.61)	<0.001

Table 3. Coefficients of all variables for all percentiles

	tau=.03	**tau= .05**	**tau= .10**	**tau= .25**	**tau= .50**	**tau= .75**	**tau= .90**	**tau= .95**	**tau= .97**	**OLS**
(Intercept)	-5490.4	-5309.5	-5203.1	-5188.2	-5280.5	-5258.1	-5055.5	-4924.6	-4892.7	-5.204
Gestational age	174.6	172	170.9	173.2	178.5	181	179	176.9	177.7	176.5
parity	31.7	31.9	33.6	33.4	33.7	36	37.6	36.3	41.9	34.4
Gender of baby, M, ref =F	102.9	109.8	119	126.6	141.2	147.9	146	149.2	147.8	136.6
Mother's age	-2.2	-1.6	-1.1	0.1	1	1.6	2.4	3.6	3.6	0.9
Preterm, Yes, ref =N	-37.5	-36.1	-49.9	-49.4	-53.8	-65.5	-80.7	-81.4	-97.1	-58.6
Depression, Yes, ref = N	-18.5	-7.8	-10.2	-13.1	-17.3	-17.6	-23.7	-22	-4.2	-17.3
Bipolar, Yes, ref =N	-43.8	-109.9	-78.8	-75.3	-70.2	-61.4	39.4	108.7	101.3	-49.5
Hispanic, Non-Hispanic,	8.6	5.5	8.2	11.9	11.2	11.3	15.5	8.4	-5.4	9.7
Hispanic,	-12.6	-28.9	-21.9	-15.2	-14.5	-13.5	-20.4	-49.2	-67.2	-19.3
Race, Black, ref =Asian	-123.1	-141	-132.9	-119	-94.7	-104.5	-115.6	-154.2	-114.4	-114.7
Race, Other	-24.1	-33.1	-16.2	3	16.3	26.6	24.5	-15.4	-14.3	8.3
Race, White	13.5	13.6	22.2	39	46.3	46.8	33	-3.8	-0.4	36.1
Mom's height	18.9	18.6	18.7	18.8	19.7	20.4	21	22.2	22.4	19.9
Mom's weight	0.7	0.8	1	1.3	1.5	1.9	2.4	2.6	2.8	1.5

Table 4. p-values for all variables for all percentiles

	tau=.03	**tau= .05**	**tau= .1**	**tau= .25**	**tau= .50**	**tau =.75**	**tau =.9**	**tau =.95**	**tau =.97**	**OLS**
(Intercept)	0	0	0	0	0	0	0	0	0	0
Gestational age	0	0	0	0	0	0	0	0	0	0
parity	0	0	0	0	0	0	0	0	0	0
Gender of baby, M, ref	0	0	0	0	0	0	0	0	0	0
Mother's age	0	0	0	0.678	0	0	0	0	0	0
Preterm, Yes, ref =N	0	0	0	0	0	0	0	0	0	0
Depression, Yes, ref = N	0.038	0.19	0.061	0	0	0	0	0.001	0.712	0
Bipolar, Yes, ref =N	0.581	0	0	0	0	0.038	0.25	0	0.097	0
Hispanic, Non-Hispanic,	0.089	0.197	0.041	0	0	0.001	0	0.146	0.516	0
Hispanic,	0.419	0	0.033	0.06	0.031	0.083	0.041	0	0	0.0003
Race, Black, ref =Asian	0	0	0	0	0	0	0	0	0.001	0
Race, Other	0.031	0.013	0.148	0.776	0.04	0.015	0.172	0.599	0.651	0.320
Race, White	0.165	0.281	0.036	0	0	0	0.059	0.896	0.991	0
Mom's height	0	0	0	0	0	0	0	0	0	0
Mom's weight	0	0	0	0	0	0	0	0	0	0

Figures

Figure 1. Scatter plot of gestational age versus birth weight.

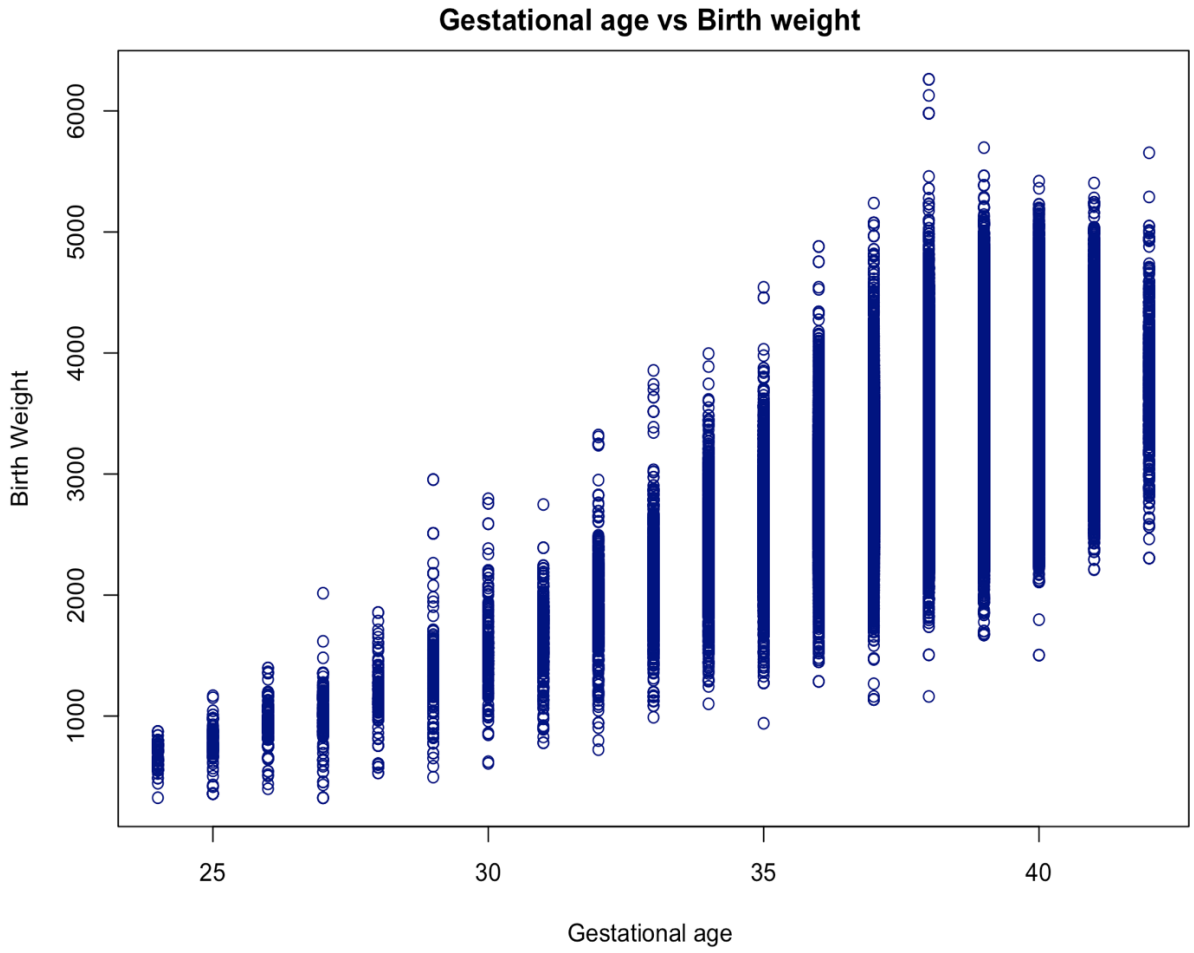


Figure 2.

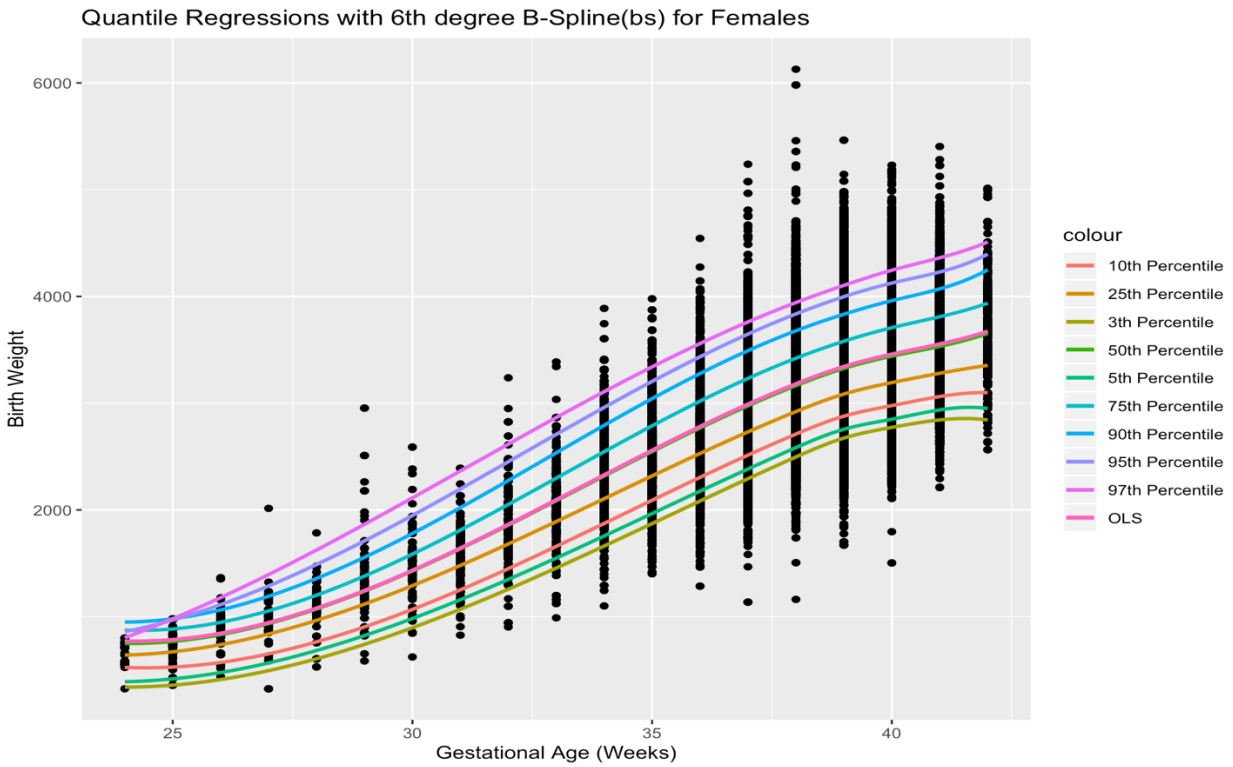


Figure 3.

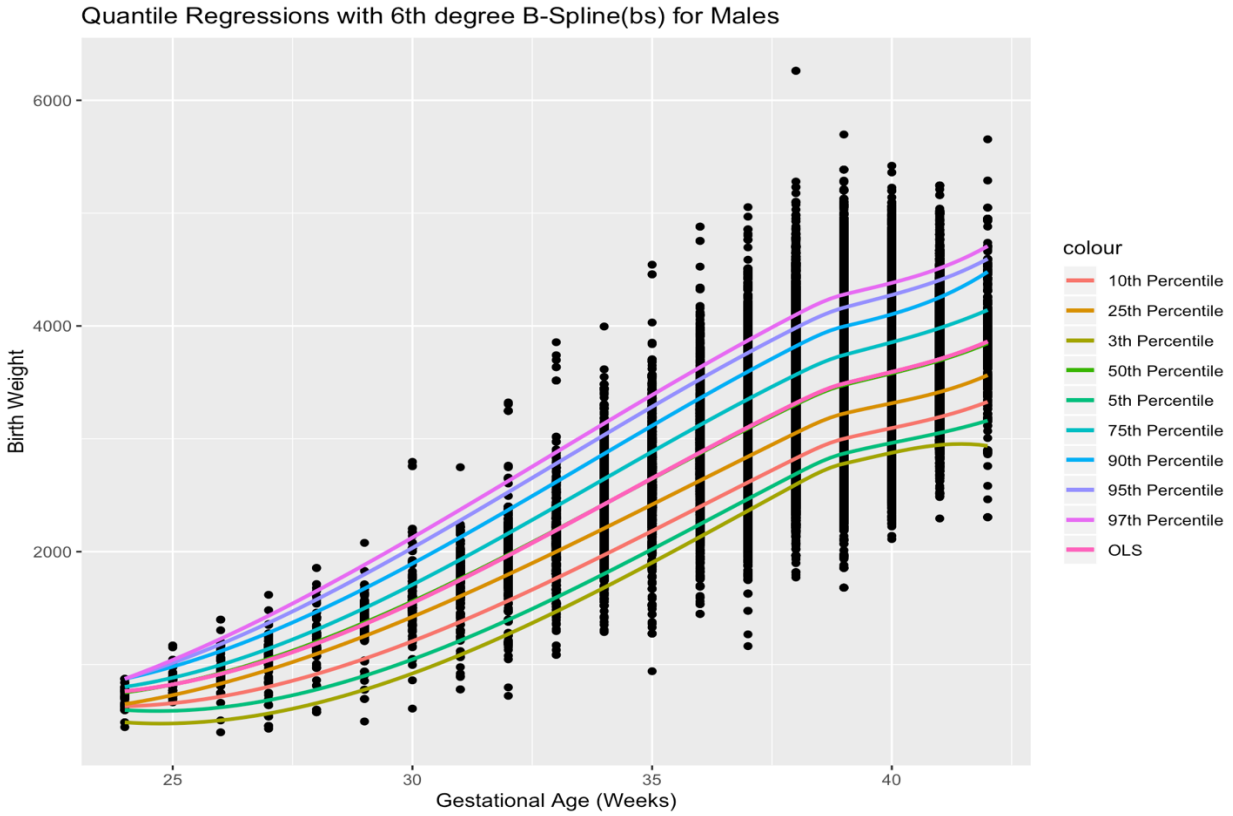


Figure 4.

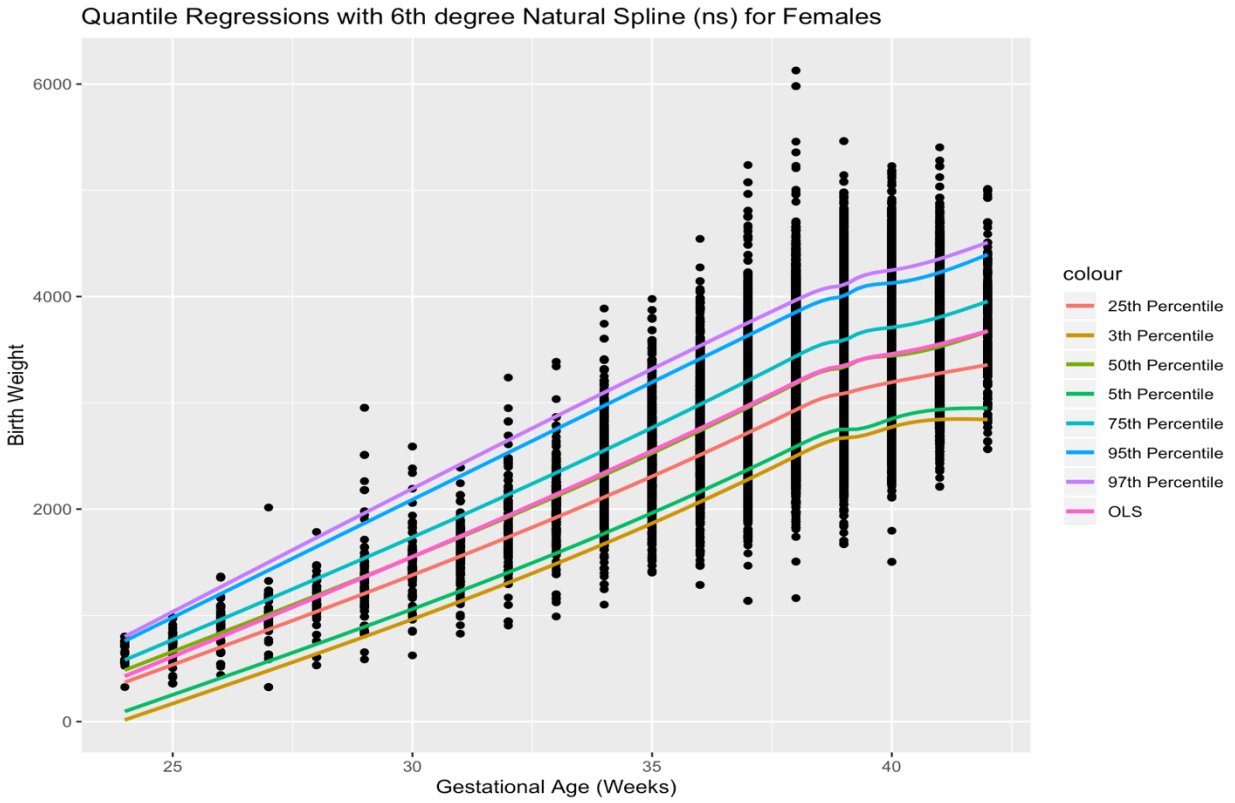
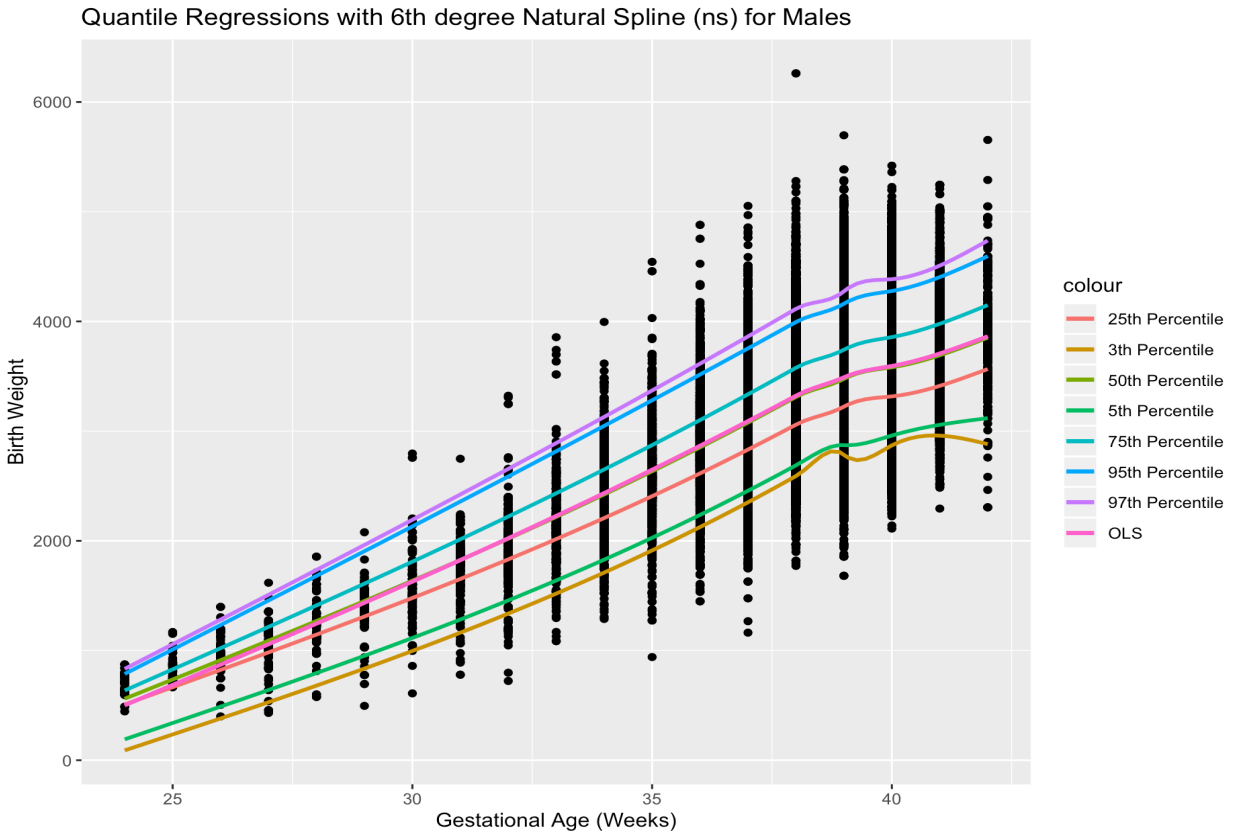


Figure 5.



Text

For sensitivity analysis, Natural spline method have been used instead of b-spline method. For the quality control, mean regression method is used and noted the estimates of the mean regression is very close to the median (or L1) regression estimates.

Additional Information for Project PI

Guidelines for Authorship

In general, authorship is merited and expected for PHR/SDBC statisticians and collaborators. Exceptions may be made if the number of authors is limited by the journal, but please discuss with the PHR/SDBD collaborators. The criteria for authorship by the International Committee of Medical Journal Editors can be found online at: https://medicine.utah.edu/ccts/sdbc/publish.php.

PHR/SDBC Policy requires manuscripts, posters and abstracts be made available to PHR/SDBC statisticians and collaborators with reasonable time (1 week+ for papers) prior to submission.

Acknowledging CCTS funding

Please remember to acknowledge the SDBC: “This investigation was supported by the University of Utah Study Design and Biostatistics Center, with funding in part from the National Center for Research Resources and the National Center for Advancing Translational Sciences, National Institutes of Health, through Grant UL1TR002538.”.