



Universiteit  
Leiden  
The Netherlands

## Data-driven donation strategies: understanding and predicting blood donor deferral

Vinkenoog, M.

### Citation

Vinkenoog, M. (2024, February 15). *Data-driven donation strategies: understanding and predicting blood donor deferral*. Retrieved from <https://hdl.handle.net/1887/3717530>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/3717530>

**Note:** To cite this publication please use the final published version (if applicable).

# Bibliography

- [1] C. Politis, J. C. Wiersum, C. Richardson, P. Robillard, J. Jorgensen, P. Renaudier, J.-C. Faber, and E. M. Wood. “The International Haemovigilance Network Database for the Surveillance of Adverse Reactions and Events in Donors and Recipients of Blood Components: technical issues and results”. In: *Vox Sanguinis* 111.4 (2016), pp. 409–417.
- [2] Richard G. Cable, Simone A. Glynn, Joseph E. Kiss, Alan E. Mast, Whitney R. Steele, Edward L. Murphy, David J. Wright, Ronald A. Sacher, Jerry L. Gottschall, Leslie H. Tobler, Toby L. Simon, and for the NHLBI Retrovirus Epidemiology Donor Study-II (REDS-II). “Iron deficiency in blood donors: the REDS-II Donor Iron Status Evaluation (RISE) study”. In: *Transfusion* 52.4 (2012), pp. 702–711.
- [3] Bryan R. Spencer and Alan E. Mast. “Iron status of blood donors”. In: *Current Opinion in Hematology* 29.6 (Nov. 2022), pp. 310–316.
- [4] Saurabh Zalpuri, Nienke Schotten, A Mireille Baart, Leo M van de Watering, Katja van den Hurk, and Marian GJ van Kraaij. “Iron deficiency-related symptoms in whole blood donors: a systematic review”. In: *Transfusion* 59.10 (2019), pp. 3275–3287.

- [5] Susan F. Clark. “Iron Deficiency Anemia”. In: *Nutrition in Clinical Practice* 23.2 (2008), pp. 128–141.
- [6] Laura Dean. “Blood and the cells it contains”. In: *Blood Groups and Red Cell Antigens*. National Center for Biotechnology Information (US), 2005.
- [7] M. Domenica Cappellini and Irene Motta. “Anemia in Clinical Practice-Definition and Classification: Does Hemoglobin Change With Aging?” In: *Seminars in Hematology* 52.4 (Oct. 2015), pp. 261–269.
- [8] Nazanin Abbaspour, Richard Hurrell, and Roya Kelishadi. “Review on iron and its importance for human health”. In: *Journal of Research in Medical Sciences : The Official Journal of Isfahan University of Medical Sciences* 19.2 (Feb. 2014), pp. 164–174.
- [9] Axel Dignass, Karima Farrag, Jürgen Stein, et al. “Limitations of serum ferritin in diagnosing iron deficiency in inflammatory conditions”. In: *International journal of chronic diseases* 2018 (2018).
- [10] Maria Nieves Garcia-Casal, Sant-Rayn Pasricha, Ricardo X. Martinez, Lucero Lopez-Perez, and Juan Pablo Peña-Rosas. “Serum or plasma ferritin concentration as an index of iron deficiency and overload”. In: *Cochrane Database of Systematic Reviews* 5 (2021).
- [11] World Health Organization. *Serum ferritin concentrations for the assessment of iron status and iron deficiency in populations*. Tech. rep. World Health Organization, 2011.
- [12] Nienke Schotten, Pieterneel C. M. Pasker-de Jong, Diego Moretti, Michael B. Zimmermann, Anneke J. Geurts-Moespot, Dorine W. Swinkels, and Marian G. J. van Kraaij. “The donation interval of 56 days requires extension to 180 days for whole blood donors to recover from changes in iron metabolism”. In: *Blood* 128.17 (Oct. 2016), pp. 2185–2188.
- [13] Inge-Lis Kanstrup and Björn Ekblom. “Blood volume and hemoglobin concentration as determinants of maximal aerobic power”. In: *Medicine & Science in Sports & Exercise* 16.3 (June 1984), p. 256.
- [14] Kristin L. Sainani. “Explanatory Versus Predictive Modeling”. In: *PM&R* 6.9 (Sept. 2014), pp. 841–844.
- [15] Takaya Saito and Marc Rehmsmeier. “The Precision-Recall Plot Is More Informative than the ROC Plot When Evaluating Binary Classifiers on Imbalanced Datasets”. In: *PLOS ONE* 10.3 (Mar. 2015), e0118432.

- [16] Clement A Finch, James D Cook, Robert F Labbe, and Maria Culala. “Effect of blood donation on iron stores as evaluated by serum ferritin”. In: (1977).
- [17] Sareen S Gropper and Jack L Smith. *Advanced nutrition and human metabolism*. Cengage Learning, 2012.
- [18] Joseph E. Kiss and Ralph R. Vassallo. “How do we manage iron deficiency after blood donation?” In: *British Journal of Haematology* 181.5 (2018), pp. 590–603.
- [19] Esa T. Soppi. “Iron deficiency without anemia – a clinical challenge”. In: *Clinical Case Reports* 6.6 (Apr. 2018), pp. 1082–1086.
- [20] Joseph E. Kiss, Donald Brambilla, Simone A. Glynn, Alan E. Mast, Bryan R. Spencer, Mars Stone, Steven H. Kleinman, Ritchard G. Cable, and Lung for the National Heart and Blood Institute (NHLBI) Recipient Epidemiology and Donor Evaluation Study–III (REDS-III). “Oral Iron Supplementation After Blood Donation: A Randomized Clinical Trial”. In: *JAMA* 313.6 (Feb. 2015), pp. 575–583.
- [21] Maike G. Sweegers, Marian G.J. van Kraaij, and Katja van den Hurk. “First do no harm: iron loss in whole blood donors”. In: *ISBT Science Series* 15.1 (2020), pp. 110–117.
- [22] *Sanquin Annual Report 2018*.
- [23] N. Milman, M. Kirchhoff, and T. JØrgensen. “Iron status markers, serum ferritin and hemoglobin in 1359 Danish women in relation to menstruation, hormonal contraception, parity, and postmenopausal hormone treatment”. In: *Annals of Hematology* 65.2 (Aug. 1992), pp. 96–102.
- [24] Nils Milman and Marianne Kirchhoff. “Influence of blood donation on iron stores assessed by serum ferritin and haemoglobin in a population survey of 1433 Danish males”. In: *European Journal of Haematology* 47.2 (1991), pp. 134–139.
- [25] Emanuele Di Angelantonio et al. “Efficiency and safety of varying the frequency of whole blood donation (INTERVAL): a randomised trial of 45 000 donors”. In: *The Lancet* 390.10110 (Nov. 2017), pp. 2360–2371.
- [26] Romilla Mittal, Neelam Marwaha, Sabita Basu, Harsh Mohan, and A. Ravi Kumar. “Evaluation of iron stores in blood donors by serum ferritin”. In: *Indian Journal of Medical Research* 124.6 (Dec. 2006), p. 641.

- [27] Brian Custer, Karen S. Schlumpf, David Wright, Toby L. Simon, Susan Wilkinson, Paul M. Ness, and for the NHLBI Retrovirus Epidemiology Donor Study-II. “Donor return after temporary deferral”. In: *Transfusion* 51.6 (2011), pp. 1188–1196.
- [28] Brian Custer, Artina Chinn, Nora V Hirschler, Michael P Busch, and Edward L Murphy. “The consequences of temporary deferral on future whole blood donation”. In: *Transfusion* 47.8 (2007), pp. 1514–1523.
- [29] Marloes LC Spekman, Theo G van Tilburg, and Eva-Maria Merz. “Do deferred donors continue their donations? A large-scale register study on whole blood donor return in the Netherlands”. In: *Transfusion* 59.12 (2019), pp. 3657–3665.
- [30] Martin Falkingham, Asmaa Abdelhamid, Peter Curtis, Susan Fairweather-Tait, Louise Dye, and Lee Hooper. “The effects of oral iron supplementation on cognition in older children and adults: a systematic review and meta-analysis”. In: *Nutrition Journal* 9.1 (Jan. 2010), p. 4.
- [31] Jed B Gorlin. “Iron replacement: precautionary principle versus risk-based decision making”. In: *Transfusion* 59.5 (May 2019), pp. 1613–1615.
- [32] Andreas S. Rigas, Ole B. Pedersen, Cecilie J. Sørensen, Erik Sørensen, Sebastian R. Kotzé, Mikkel S. Petersen, Lise W. Thørner, Henrik Hjalgrim, Christian Erikstrup, and Henrik Ullum. “No association between iron status and self-reported health-related quality of life in 16,375 Danish blood donors: results from the Danish Blood Donor Study”. In: *Transfusion* 55.7 (2015), pp. 1752–1756.
- [33] Graham A. Smith, Sheila A. Fisher, Carolyn Doree, Emanuele Di Angelantonio, and David J. Roberts. “Oral or parenteral iron supplementation to reduce deferral, iron deficiency and/or anaemia in blood donors”. In: *Cochrane Database of Systematic Reviews* 7 (2014).
- [34] Mindy Goldman, Whitney R. Steele, Emanuele Di Angelantonio, Katja van den Hurk, Ralph R. Vassallo, Marc Germain, Sheila F. O’Brien, and Biomedical Excellence for Safer Transfusion Collaborative (BEST) Investigators. “Comparison of donor and general population demographics over time: a BEST Collaborative group study”. In: *Transfusion* 57.10 (2017), pp. 2469–2476.
- [35] Sophie Waldvogel-Abramowski, Gérard Waeber, Christoph Gassner, Andreas Buser, Beat M. Frey, Bernard Favrat, and Jean-Daniel Tissot. “Physiology

- of Iron Metabolism". In: *Transfusion Medicine and Hemotherapy* 41.3 (May 2014), pp. 213–221.
- [36] Marieke Vinkenoog, Katja van den Hurk, Marian van Kraaij, Matthijs van Leeuwen, and Mart P Janssen. "First results of a ferritin-based blood donor deferral policy in the Netherlands". In: *Transfusion* 60.8 (2020), pp. 1785–1792.
- [37] Stephen Kaptoge et al. "Longer-term efficiency and safety of increasing the frequency of whole blood donation (INTERVAL): extension study of a randomised trial of 20757 blood donors". In: *The Lancet Haematology* 6.10 (Oct. 2019), e510–e520.
- [38] Bryan Spencer. "Blood donor iron status: are we bleeding them dry?" In: *Current opinion in hematatology* 20.6 (Nov. 2013), pp. 533–539.
- [39] A. Lecube, C. Hernández, D. Pelegrí, and R. Simó. "Factors accounting for high ferritin levels in obesity". In: *International Journal of Obesity* 32.11 (Nov. 2008), pp. 1665–1669.
- [40] Tiffany C. Timmer, Rosa de Groot, Judith J.M. Rijnhart, Jeroen Lakerveld, Johannes Brug, Corine W.M. Perenboom, A. Mireille Baart, Femmeke J. Prinsze, Saurabh Zalpuri, C. Ellen van der Schoot, Wim L.A.M. de Kort, and Katja van den Hurk. "Dietary intake of heme iron is associated with ferritin and hemoglobin levels in Dutch blood donors: results from Donor InSight". In: *Haematologica* 105.10 (Nov. 2019), pp. 2400–2406.
- [41] Susan J. Fairweather-Tait. "Iron nutrition in the UK: getting the balance right". In: *Proceedings of the Nutrition Society* 63.4 (Nov. 2004), pp. 519–528.
- [42] Steven Bell, Andreas S. Rigas, Magnus K. Magnusson, Egil Ferkingstad, Elias Allara, Gyda Bjornsdottir, Anna Ramond, Erik Sørensen, Gisli H. Halldorsson, Dirk S. Paul, Kristoffer S. Burgdorf, Hannes P. Eggertsson, Joanna M. M. Howson, Lise W. Thørner, Snaedis Kristmundsdottir, William J. Astle, Christian Erikstrup, Jon K. Sigurdsson, Dragana Vuckovic, Khoa M. Dinh, Vinicius Tragante, Praveen Surendran, Ole B. Pedersen, Brynjar Vidarsson, Tao Jiang, Helene M. Paarup, Pall T. Onundarson, Parsa Akbari, Kaspar R. Nielsen, Sigrun H. Lund, Kristinn Juliusson, Magnus I. Magnusson, Michael L. Frigge, Asmundur Oddsson, Isleifur Olafsson, Stephen Kaptoge, Henrik Hjalgrim, Gudmundur Runarsson, Angela M. Wood, Ingileif Jonsdottir, Thomas F. Hansen, Olof Sigurdardottir, Hreinn Stefansson, David Rye, James E. Peters, David Westergaard, Hilma Holm, Nicole Soranzo, Karina Banasik, Gudmar Thorleifsson, Willem H. Ouwehand, Unnur Thorsteinsdottir, David J. Roberts, Patrick

- Sulem, Adam S. Butterworth, Daniel F. Gudbjartsson, John Danesh, Søren Brunak, Emanuele Di Angelantonio, Henrik Ullum, and Kari Stefansson. “A genome-wide meta-analysis yields 46 new loci associating with biomarkers of iron homeostasis”. In: *Communications Biology* 4.1 (Feb. 2021), pp. 1–14.
- [43] Joseph E Kiss. “Laboratory and genetic assessment of iron deficiency in blood donors”. In: *Clinics in laboratory medicine* 35.1 (2015), pp. 73–91.
- [44] Bryan R. Spencer, Yuelong Guo, Richard G. Cable, Joseph E. Kiss, Michael P. Busch, Grier P. Page, Stacy M. Endres-Dighe, Steven Kleinman, Simone A. Glynn, Alan E. Mast, and For the National Heart, Lung, and Blood Institute Recipient Epidemiology and Donor Evaluation Study-III (REDS-III). “Iron status and risk factors for iron depletion in a racially/ethnically diverse blood donor population”. In: *Transfusion* 59.10 (2019), pp. 3146–3156.
- [45] Muriel Lobier, Johanna Castrén, Pia Niittymäki, Elina Palokangas, Jukka Partanen, and Mikko Arvas. “The effect of donation activity dwarfs the effect of lifestyle, diet and targeted iron supplementation on blood donor iron stores”. In: *PLOS ONE* 14.8 (Aug. 2019), e0220862.
- [46] Mohammed S Ellulu, Ismail Patimah, Huzwah Khaza’ai, Asmah Rahmat, and Yehia Abed. “Obesity and inflammation: the linking mechanism and the complications”. In: *Archives of medical science: AMS* 13.4 (2017), pp. 851–863.
- [47] Andrew J Ghio and Mitchell D Cohen. “Disruption of iron homeostasis as a mechanism of biologic effect by ambient air pollution particles”. In: *Inhalation toxicology* 17.13 (2005), pp. 709–716.
- [48] S. P. Doherty, C. Prophete, P. Maciejczyk, K. Salnikow, T. Gould, T. Larson, J. Koenig, P. Jaques, C. Sioutas, J. T. Zelikoff, M. Lippmann, and M. D. Cohen. “Detection of Changes in Alveolar Macrophage Iron Status Induced by Select PM2.5-Associated Components Using Iron-Response Protein Binding Activity”. In: *Inhalation Toxicology* 19.6-7 (Jan. 2007), pp. 553–562.
- [49] Rosa de Groot, Katja van den Hurk, Linda J. Schoonmade, Wim L. A. M. de Kort, Johannes Brug, and Jeroen Lakerveld. “Urban-rural differences in the association between blood lipids and characteristics of the built environment: a systematic review and meta-analysis”. In: *BMJ Global Health* 4.1 (Jan. 2019), e001017.

- [50] Jeroen Lakerveld, Alfred Wagtendonk, Ilonca Vaartjes, Derek Karssenberg, Jeroen Lakerveld, Brenda Penninx, Joline Beulens, Erik Timmermans, Martijn Huisman, Alfred Wagtendonk, Sophia Kramer, Marieke van Wier, Dorret Boomsma, Gonneke Willemse, Carlo Schuengel, Mirjam Oosterman, Karien Stronks, Derek Karssenberg, Roel Vermeulen, Ilonca Vaartjes, Annemarie Koster, Coen Stehouwer, Katja van den Hurk, Eric Koomen, Renée de Mutsert, Margreet ten Have, Monique Verschuren, Susan Picavet, Mariëlle Beenackers, Frank van Lenthe, Arfan Ikram, Vincent Jaddoe, Tineke Oldehinkel, Trynke de Jong, Saakje Mulder, Aafje Dotinga, and GECCO Consortium. “Deep phenotyping meets big data: the Geoscience and hEalth Cohort COnsortium (GECCO) data to enable exposome studies in The Netherlands”. In: *International Journal of Health Geographics* 19.1 (Nov. 2020), p. 49.
- [51] James P Stevens. *Applied multivariate statistics for the social sciences*. Routledge, 2012.
- [52] Cheng-Hsien Li. “Confirmatory factor analysis with ordinal data: Comparing robust maximum likelihood and diagonally weighted least squares”. In: *Behavior Research Methods* 48.3 (Sept. 2016), pp. 936–949.
- [53] Li-tze Hu and Peter M. Bentler. “Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives”. In: *Structural Equation Modeling: A Multidisciplinary Journal* 6.1 (Jan. 1999), pp. 1–55.
- [54] Andreas Stribolt Rigas, Cecilie Juul Sørensen, Ole Birger Pedersen, Mikkel Steen Petersen, Lise Wegner Thørner, Sebastian Kotzé, Erik Sørensen, Karin Magnussen, Klaus Rostgaard, Christian Erikstrup, and Henrik Ullum. “Predictors of iron levels in 14,737 Danish blood donors: results from the Danish Blood Donor Study”. In: *Transfusion* 54.3pt2 (2014), pp. 789–796.
- [55] Saurabh Zalpuri, Bas Romeijn, Elias Allara, Mindy Goldman, Hany Kamel, Jed Gorlin, Ralph Vassallo, Yves Grégoire, Naoko Goto, Peter Flanagan, Joanna Speedy, Andreas Buser, Jose Mauro Kutner, Karin Magnussen, Johanna Castrén, Liz Culler, Harry Sussmann, Femmeke J. Prinsze, Kevin Belanger, Veerle Compernolle, Pierre Tiberghien, Jose Manuel Cardenas, Manish J. Gandhi, Kamille A. West, Cheuk-Kwong Lee, Sian James, Deanne Wells, Laurie J. Sutor, Silvano Wendel, Matthew Coleman, Axel Seltsam, Kimberly Roden, Whitney R. Steele, Milos Bohonek, Ramir Alcantara, Emanuele Di Angelantonio, Katja van den Hurk, and BEST Collaborative Study Group. “Variations in hemoglobin measurement and eligibility criteria across blood donation services are associated

- with differing low-hemoglobin deferral rates: a BEST Collaborative study”. In: *Transfusion* 60.3 (2020), pp. 544–552.
- [56] Andrew J. Ghio, Joleen M. Soukup, Lisa A. Dailey, and Michael C. Madden. “Air pollutants disrupt iron homeostasis to impact oxidant generation, biological effects, and tissue injury”. In: *Free Radical Biology and Medicine*. Air Pollution: Consequences for Cellular Redox Signaling, Antioxidant Defenses and Disease 151 (May 2020), pp. 38–55.
- [57] Wenli Guo, Jie Zhang, Wenjun Li, Ming Xu, and Sijin Liu. “Disruption of iron homeostasis and resultant health effects upon exposure to various environmental pollutants: A critical review”. In: *Journal of environmental sciences* 34 (2015), pp. 155–164.
- [58] Jacob Westfall and Tal Yarkoni. “Statistically Controlling for Confounding Constructs Is Harder than You Think”. In: *PLOS ONE* 11.3 (Mar. 2016), e0152719.
- [59] Janet E Cade, Jennifer A Moreton, Beverley O’Hara, Darren C Greenwood, Juliette Moor, Victoria J Burley, Kairen Kukalizch, D Tim Bishop, and Mark Worwood. “Diet and genetic factors associated with iron status in middle-aged women”. In: *The American Journal of Clinical Nutrition* 82.4 (Oct. 2005), pp. 813–820.
- [60] H. A. Jackson, K. Carter, C. Darke, M. G. Guttridge, D. Ravine, R. D. Hutton, J. A. Napier, and M. Worwood. “HFE mutations, iron deficiency and overload in 10 500 blood donors”. In: *British Journal of Haematology* 114.2 (2001), pp. 474–484.
- [61] Erik Sørensen, Katrine Grau, Trine Berg, Anne Catrine Simonsen, Karin Magnussen, Christian Erikstrup, Morten Bagge Hansen, and Henrik Ullum. “A genetic risk factor for low serum ferritin levels in Danish blood donors”. In: *Transfusion* 52.12 (2012), pp. 2585–2589.
- [62] WW Hawkins, Eirlys Speck, and Verna G Leonard. “Variation of the hemoglobin level with age and sex”. In: *Blood* 9.10 (1954), pp. 999–1007.
- [63] Saeed Aghabozorgi, Ali Seyed Shirkhorshidi, and Teh Ying Wah. “Time-series clustering – A decade review”. In: *Information Systems* 53 (Oct. 2015), pp. 16–38.
- [64] T Warren Liao. “Clustering of time series data—a survey”. In: *Pattern recognition* 38.11 (2005), pp. 1857–1874.

- 
- [65] Sangeeta Rani and Geeta Sikka. “Recent techniques of clustering of time series data: a survey”. In: *International Journal of Computer Applications* 52.15 (2012).
  - [66] Donald J Berndt and James Clifford. “Using dynamic time warping to find patterns in time series.” In: *KDD workshop*. Vol. 10. Seattle, WA, USA: 1994, pp. 359–370.
  - [67] Stuart Lloyd. “Least squares quantization in PCM”. In: *IEEE transactions on information theory* 28.2 (1982), pp. 129–137.
  - [68] Andreas Eckner. “Algorithms for unevenly-spaced time series: Moving averages and other rolling operators”. In: *Working Paper*. 2012.
  - [69] Hasim Sak, Andrew W Senior, and Françoise Beaufays. “Long short-term memory recurrent neural network architectures for large scale acoustic modeling”. In: (2014).
  - [70] Daniel Neil, Michael Pfeiffer, and Shih-Chii Liu. “Phased lstm: Accelerating recurrent network training for long or event-based sequences”. In: *Advances in neural information processing systems* 29 (2016).
  - [71] Yu Zhu, Hao Li, Yikang Liao, Beidou Wang, Ziyu Guan, Haifeng Liu, and Deng Cai. “What to Do Next: Modeling User Behaviors by Time-LSTM.” In: *IJCAI*. Vol. 17. 2017, pp. 3602–3608.
  - [72] Zhengping Che, Sanjay Purushotham, Kyunghyun Cho, David Sontag, and Yan Liu. “Recurrent neural networks for multivariate time series with missing values”. In: *Scientific reports* 8.1 (2018), p. 6085.
  - [73] Nathan Post, Danielle Eddy, Catherine Huntley, May CI van Schalkwyk, Madhumita Shrotri, David Leeman, Samuel Rigby, Sarah V Williams, William H Birmingham, Paul Kellam, et al. “Antibody response to SARS-CoV-2 infection in humans: a systematic review (preprint)”. In: (2020).
  - [74] Dianna L Ng, Gregory M Goldgof, Brian R Shy, Andrew G Levine, Joanna Balceruk, Sagar P Bapat, John Prostko, Mary Rodgers, Kelly Coller, Sandra Pearce, et al. “SARS-CoV-2 seroprevalence and neutralizing activity in donor and patient blood”. In: *Nature communications* 11.1 (2020), p. 4698.
  - [75] Pyoeng Gyun Choe, Kye-Hyung Kim, Chang Kyung Kang, Hyeon Jeong Suh, EunKyo Kang, Sun Young Lee, Nam Joong Kim, Jongyoun Yi, Wan Beom Park, and Myoung-don Oh. “Antibody responses one year after mild SARS-CoV-2 infection”. In: *Journal of Korean medical science* 36.21 (2021).

- [76] Anu Haveri, Nina Ekström, Anna Solastie, Camilla Virta, Pamela Österlund, Elina Isosaari, Hanna Nohynek, Arto A Palmu, and Merit Melin. “Persistence of neutralizing antibodies a year after SARS-CoV-2 infection in humans”. In: *European Journal of Immunology* 51.12 (2021), pp. 3202–3213.
- [77] Maurice Steenhuis, Gerard van Mierlo, Ninotska IL DerkSEN, Pleuni Ooijevaarde Heer, Simone Kruithof, Floris L Loeff, Lea C Berkhout, Federica Linty, Chantal Reusken, Johan Reimerink, et al. “Dynamics of antibodies to SARS-CoV-2 in convalescent plasma donors”. In: *Clinical & translational immunology* 10.5 (2021), e1285.
- [78] Erik H Vogelzang, Floris C Loeff, Ninotska IL DerkSEN, Simone Kruithof, Pleuni Ooijevaarde Heer, Gerard van Mierlo, Federica Linty, Juk Yee Mok, Wim van Esch, Sanne de Bruin, et al. “Development of a SARS-CoV-2 total antibody assay and the dynamics of antibody response over time in hospitalized and non-hospitalized patients with COVID-19”. In: *The Journal of Immunology* 205.12 (2020), pp. 3491–3499.
- [79] Sabra L Klein, Andrew Pekosz, Han-Sol Park, Rebecca L Ursin, Janna R Shapiro, Sarah E Benner, Kirsten Littlefield, Swetha Kumar, Harnish Mukesh Naik, Michael J Betenbaugh, et al. “Sex, age, and hospitalization drive antibody responses in a COVID-19 convalescent plasma donor population”. In: *The Journal of clinical investigation* 130.11 (2020), pp. 6141–6150.
- [80] Mark Hamer, Catharine R Gale, Mika Kivimäki, and G David Batty. “Overweight, obesity, and risk of hospitalization for COVID-19: A community-based cohort study of adults in the United Kingdom”. In: *Proceedings of the National Academy of Sciences* 117.35 (2020), pp. 21011–21013.
- [81] Mohitosh Biswas, Shawonur Rahaman, Tapash Kumar Biswas, Zahirul Haque, and Baharudin Ibrahim. “Association of sex, age, and comorbidities with mortality in COVID-19 patients: a systematic review and meta-analysis”. In: *Intervirology* 64.1 (2021), pp. 36–47.
- [82] Nicholas S Hendren, James A De Lemos, Colby Ayers, Sandeep R Das, Anjali Rao, Spencer Carter, Anna Rosenblatt, Jason Walchok, Wally Omar, Rohan Khera, et al. “Association of body mass index and age with morbidity and mortality in patients hospitalized with COVID-19: results from the American Heart Association COVID-19 Cardiovascular Disease Registry”. In: *Circulation* 143.2 (2021), pp. 135–144.

- [83] Guillaume Plourde, Emanuel Fournier-Ross, Hubert Tessier-Grenier, Louis-Antoine Mullie, Michaël Chassé, and François Martin Carrier. “Association between obesity and hospital mortality in critical COVID-19: a retrospective cohort study”. In: *International Journal of Obesity* 45.12 (2021), pp. 2617–2622.
- [84] Jeffrey L Anderson, Heidi T May, Stacey Knight, Tami L Bair, Joseph B Muhlestein, Kirk U Knowlton, and Benjamin D Horne. “Association of sociodemographic factors and blood group type with risk of COVID-19 in a US population”. In: *JAMA Network Open* 4.4 (2021), e217429–e217429.
- [85] Mattia Miotto, Lorenzo Di Renzo, Giorgio Gosti, Edoardo Milanetti, and Giancarlo Ruocco. “Does blood type affect the COVID-19 infection pattern?” In: *Plos one* 16.5 (2021), e0251535.
- [86] Juanjuan Zhao, Quan Yuan, Haiyan Wang, Wei Liu, Xuejiao Liao, Yingying Su, Xin Wang, Jing Yuan, Tingdong Li, Jinxiu Li, et al. “Antibody responses to SARS-CoV-2 in patients with novel coronavirus disease 2019”. In: *Clinical infectious diseases* 71.16 (2020), pp. 2027–2034.
- [87] Maya F Amjadi, Sarah E O’Connell, Tammy Armbrust, Aisha M Mergaert, Sandeep R Narpala, Peter J Halfmann, S Janna Bashar, Christopher R Glover, Anna S Heffron, Alison Taylor, et al. “Specific COVID-19 symptoms correlate with high antibody levels against SARS-CoV-2”. In: *Immunohorizons* 5.6 (2021), pp. 466–476.
- [88] National Institute for Public Health and the Environment (RIVM). *Coronavirus Disease COVID-19*. Tech. rep.
- [89] Seiya Yamayoshi, Atsuhiro Yasuhara, Mutsumi Ito, Osamu Akasaka, Morio Nakamura, Ichiro Nakachi, Michiko Koga, Keiko Mitamura, Kazuma Yagi, Kenji Maeda, et al. “Antibody titers against SARS-CoV-2 decline, but do not disappear for several months”. In: *EClinicalMedicine* 32 (2021), p. 100734.
- [90] Steven G Luke. “Evaluating significance in linear mixed-effects models in R”. In: *Behavior research methods* 49 (2017), pp. 1494–1502.
- [91] Jitian Li, Zhe Chen, Yifei Nie, Yan Ma, Qiaoyun Guo, and Xiaofeng Dai. “Identification of symptoms prognostic of COVID-19 severity: multivariate data analysis of a case series in Henan Province”. In: *Journal of medical Internet research* 22.6 (2020), e19636.

- [92] Catherine Gebhard, Vera Regitz-Zagrosek, Hannelore K Neuhauser, Rosemary Morgan, and Sabra L Klein. “Impact of sex and gender on COVID-19 outcomes in Europe”. In: *Biology of sex differences* 11 (2020), pp. 1–13.
- [93] Yifan Meng, Ping Wu, Wanrong Lu, Kui Liu, Ke Ma, Liang Huang, Jiaojiao Cai, Hong Zhang, Yu Qin, Haiying Sun, et al. “Sex-specific clinical characteristics and prognosis of coronavirus disease-19 infection in Wuhan, China: A retrospective study of 168 severe patients”. In: *PLoS pathogens* 16.4 (2020), e1008520.
- [94] Davide F Robbiani, Christian Gaebler, Frauke Muecksch, Julio CC Lorenzi, Zijun Wang, Alice Cho, Marianna Agudelo, Christopher O Barnes, Anna Gazumyan, Shlomo Finkin, et al. “Convergent antibody responses to SARS-CoV-2 in convalescent individuals”. In: *Nature* 584.7821 (2020), pp. 437–442.
- [95] Marloes LC Spekman, Steven Ramondt, and Maike G Sweegers. “Whole blood donor behavior and availability after deferral: consequences of a new ferritin monitoring policy”. In: *Transfusion* 61.4 (2021), pp. 1112–1121.
- [96] Marieke Vinkenoog, Katja van den Hurk, Marian van Kraaij, Matthijs van Leeuwen, and Mart P Janssen. “First results of a ferritin-based blood donor deferral policy in the Netherlands”. In: *Transfusion* 60.8 (2020), pp. 1785–1792.
- [97] Maike G. Sweegers, Saurabh Zalpuri, Franke A. Quee, Elisabeth M. J. Huis in ‘t Veld, Femmeke J. Prinsze, Emiel O. Hoogendijk, Jos W. R. Twisk, Anton W. M. van Weert, Wim L. A. M. de Kort, and Katja van den Hurk. “Ferritin measurement IN Donors—Effectiveness of iron Monitoring to diminish iron deficiency and low haemoglobin in whole blood donors (FIND’EM): study protocol for a stepped wedge cluster randomised trial”. In: *Trials* 21.1 (Oct. 2020), p. 823.
- [98] W Alton Russell, David Scheinker, and Brian Custer. “Individualized risk trajectories for iron-related adverse outcomes in repeat blood donors”. In: *Transfusion* 62.1 (2022), pp. 116–124.
- [99] AM Baart, WLAM De Kort, KGM Moons, and Y Vergouwe. “Prediction of low haemoglobin levels in whole blood donors”. In: *Vox Sanguinis* 100.2 (2011), pp. 204–211.
- [100] Kazem Nasserinejad, Joost van Rosmalen, Wim de Kort, Dimitris Rizopoulos, and Emmanuel Lesaffre. “Prediction of hemoglobin in blood donors using

- a latent class mixed-effects transition model”. In: *Statistics in medicine* 35.4 (2016), pp. 581–594.
- [101] Scott M Lundberg and Su-In Lee. “A unified approach to interpreting model predictions”. In: *Advances in neural information processing systems* 30 (2017).
- [102] William S Noble. “What is a support vector machine?” In: *Nature biotechnology* 24.12 (2006), pp. 1565–1567.
- [103] Charles R Harris, K Jarrod Millman, Stéfan J Van Der Walt, Ralf Gommers, Pauli Virtanen, David Cournapeau, Eric Wieser, Julian Taylor, Sebastian Berg, Nathaniel J Smith, et al. “Array programming with NumPy”. In: *Nature* 585.7825 (2020), pp. 357–362.
- [104] Wes McKinney et al. “Data structures for statistical computing in python”. In: *Proceedings of the 9th Python in Science Conference*. Vol. 445. Austin, TX, 2010, pp. 51–56.
- [105] Fabian Pedregosa, Gaël Varoquaux, Alexandre Gramfort, Vincent Michel, Bertrand Thirion, Olivier Grisel, Mathieu Blondel, Peter Prettenhofer, Ron Weiss, Vincent Dubourg, et al. “Scikit-learn: Machine learning in Python”. In: *the Journal of machine Learning research* 12 (2011), pp. 2825–2830.
- [106] John D Hunter. “Matplotlib: A 2D graphics environment”. In: *Computing in science & engineering* 9.03 (2007), pp. 90–95.
- [107] Lauren Berkow. “Factors affecting hemoglobin measurement”. In: *Journal of clinical monitoring and computing* 27 (2013), pp. 499–508.
- [108] Jarkko Toivonen, Yrjö Koski, Esa Turkulainen, Femmeke Prinsze, Pietro della Briotta Parolo, Markus Heinonen, and Mikko Arvas. “Prediction and impact of personalized donation intervals”. In: *Vox Sanguinis* 117.4 (2022), pp. 504–512.
- [109] Marieke Vinkenoog, Matthijs van Leeuwen, and Mart P. Janssen. “Explainable haemoglobin deferral predictions using machine learning models: Interpretation and consequences for the blood supply”. In: *Vox Sanguinis* 117.11 (2022), pp. 1262–1270.
- [110] A. Mireille Baart, Tiffany Timmer, Wim L. A. M. de Kort, and Katja van den Hurk. “Lifestyle behaviours, ethnicity and menstruation have little added value in prediction models for low haemoglobin deferral in whole blood donors”. In: *Transfusion Medicine* 30.1 (2020), pp. 16–22.

- [111] Scott M. Lundberg, Gabriel Erion, Hugh Chen, Alex DeGrave, Jordan M. Prutkin, Bala Nair, Ronit Katz, Jonathan Himmelfarb, Nisha Bansal, and Su-In Lee. “From local explanations to global understanding with explainable AI for trees”. In: *Nature Machine Intelligence* 2.1 (Jan. 2020), pp. 56–67.
- [112] R Core Team. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing, 2020.
- [113] Hadley Wickham, Romain François, Lionel Henry, Kirill Müller, and RStudio. *dplyr: A Grammar of Data Manipulation*. Sept. 2022.
- [114] Hadley Wickham, Maximilian Girlich, and RStudio. *tidy: Tidy Messy Data*. Sept. 2022.
- [115] Hadley Wickham, Winston Chang, Lionel Henry, Thomas Lin Pedersen, Kohske Takahashi, Claus Wilke, Kara Woo, Hiroaki Yutani, Dewey Dunnington, and RStudio. *ggplot2: Create Elegant Data Visualisations Using the Grammar of Graphics*. May 2022.
- [116] Sari Bäckman, Anne Valkeajärvi, Piia Korkalainen, Mikko Arvas, and Johanna Castrén. “Venous sample is superior to repeated skin-prick testing in blood donor haemoglobin second-line screening”. In: *Vox Sanguinis* 115.8 (2020), pp. 617–623.
- [117] J. A. ANDERSON. “Separate sample logistic discrimination”. In: *Biometrika* 59.1 (Apr. 1972), pp. 19–35.
- [118] Yared Paavast, Sara Moazzen, Maike Sweegers, Boris Hogema, Mart Janssen, and Katja van den Hurk. “A computational model for prediction of ferritin and haemoglobin levels in blood donors”. In: *British Journal of Haematology* 199.1 (2022), pp. 143–152.
- [119] Mart P. Janssen. “Why the majority of on-site repeat donor deferrals are completely unwarranted...” In: *Transfusion* 62.10 (2022), pp. 2068–2075.
- [120] Marieke Vinkenoog, Jarkko Toivonen, Tinus Brits, Dorien de Clippele, Veerle Compernolle, Surendra Karki, Amber Meulenbeld, Marijke Welvaert, Katja van den Hurk, Joost van Rosmalen, Emmanuel Lesaffre, Mikko Arvas, and Mart P. Janssen. “An international comparison of hemoglobin deferral prediction models for blood banking”. In: *Vox Sanguinis* (2023).

- [121] Sant-Rayn Pasricha, Zoe K. McQuilten, Anthony J. Keller, and Erica M. Wood. “Hemoglobin and iron indices in nonanemic premenopausal blood donors predict future deferral from whole blood donation”. In: *Transfusion* 51.12 (2011), pp. 2709–2713.
- [122] Mitja I. Kurki et al. *FinnGen: Unique genetic insights from combining isolated population and national health register data*. Mar. 2022.
- [123] Jarkko Toivonen, Johanna Castrén, FinnGen, and Mikko Arvas. “The Value of Genetic Data from 665,460 Individuals in Predicting Anemia and Suitability to Donate Blood”. In: *Genetic Epidemiology* 46.7 (), pp. 477–477.
- [124] Sanni Översti, Kerttu Majander, Elina Salmela, Kati Salo, Laura Arppe, Stanislav Belskiy, Heli Etu-Sihvola, Ville Laakso, Esa Mikkola, Saskia Pfrengle, Mikko Putkonen, Jussi-Pekka Taavitsainen, Katja Vuoristo, Anna Wessman, Antti Sajantila, Markku Oinonen, Wolfgang Haak, Verena J. Schuenemann, Johannes Krause, Jukka U. Palo, and Päivi Onkamo. “Human mitochondrial DNA lineages in Iron-Age Fennoscandia suggest incipient admixture and eastern introduction of farming-related maternal ancestry”. In: *Scientific Reports* 9 (Nov. 2019), p. 16883.
- [125] Konrad J. Karczewski, Laurent C. Francioli, Grace Tiao, Beryl B. Cummings, Jessica Alföldi, Qingbo Wang, Ryan L. Collins, Kristen M. Laricchia, Andrea Ganna, Daniel P. Birnbaum, Laura D. Gauthier, Harrison Brand, Matthew Solomonson, Nicholas A. Watts, Daniel Rhodes, Moriel Singer-Berk, Eleina M. England, Eleanor G. Seaby, Jack A. Kosmicki, Raymond K. Walters, Katherine Tashman, Yossi Farjoun, Eric Banks, Timothy Poterba, Arcturus Wang, Cotton Seed, Nicola Whiffin, Jessica X. Chong, Kaitlin E. Samocha, Emma Pierce-Hoffman, Zachary Zappala, Anne H. O’Donnell-Luria, Eric Vallabh Minikel, Ben Weisburd, Monkol Lek, James S. Ware, Christopher Vittal, Irina M. Armean, Louis Bergelson, Kristian Cibulskis, Kristen M. Connolly, Miguel Covarrubias, Stacey Donnelly, Steven Ferriera, Stacey Gabriel, Jeff Gentry, Namrata Gupta, Thibault Jeandet, Diane Kaplan, Christopher Llanwarne, Ruchi Munshi, Sam Novod, Nikelle Petrillo, David Roazen, Valentin Ruano-Rubio, Andrea Saltzman, Molly Schleicher, Jose Soto, Kathleen Tibbetts, Charlotte Tolonen, Gordon Wade, Michael E. Talkowski, Benjamin M. Neale, Mark J. Daly, and Daniel G. MacArthur. “The mutational constraint spectrum quantified from variation in 141,456 humans”. In: *Nature* 581.7809 (May 2020), pp. 434–443.

- [126] Kate F Kernan and Joseph A Carcillo. “Hyperferritinemia and inflammation”. In: *International Immunology* 29.9 (Nov. 2017), pp. 401–409.
- [127] Marieke Vinkenoog, Mart Janssen, and Matthijs van Leeuwen. “Challenges and limitations in clustering blood donor hemoglobin trajectories”. In: *Advanced Analytics and Learning on Temporal Data: 4th ECML PKDD Workshop, AALTD 2019, Würzburg, Germany, September 20, 2019, Revised Selected Papers 4*. Springer International Publishing. 2020, pp. 72–84.
- [128] Marieke Vinkenoog, Maurice Steenhuis, Anja ten Brinke, JG van Hasselt, Mart P Janssen, Matthijs van Leeuwen, Francis H Swaneveld, Hans Vrielink, Leo van de Watering, Franke Quee, et al. “Associations between symptoms, donor characteristics and IgG antibody response in 2082 COVID-19 convalescent plasma donors”. In: *Frontiers in immunology* 13 (2022), p. 637.
- [129] Femke Atsma, Ingrid Veldhuizen, André Verbeek, Wim de Kort, and Femmie de Vegt. “Healthy donor effect: its magnitude in health research among blood donors”. In: *Transfusion* 51.8 (2011), pp. 1820–1828.
- [130] Franke A. Quee, Karlijn Peffer, Anique D. Ter Braake, and Katja Van den Hurk. “Cardiovascular Benefits for Blood Donors? A Systematic Review”. In: *Transfusion Medicine Reviews* 36.3 (July 2022), pp. 143–151.
- [131] J. D. Cook and B. S. Skikne. “Iron deficiency: definition and diagnosis”. In: *Journal of Internal Medicine* 226.5 (1989), pp. 349–355.
- [132] D. Hugh Rushton and Julian H. Barth. “What is the evidence for gender differences in ferritin and haemoglobin?” In: *Critical Reviews in Oncology/Hematology* 73.1 (Jan. 2010), pp. 1–9.
- [133] Alan E. Mast, Aniko Szabo, Mars Stone, Ritchard G. Cable, Bryan R. Spencer, Joseph E. Kiss, and for the NHLBI Recipient Epidemiology Donor Evaluation Study (REDS)-III. “The benefits of iron supplementation following blood donation vary with baseline iron status”. In: *American Journal of Hematology* 95.7 (2020), pp. 784–791.
- [134] Jan Karregat, Maike G. Sweegers, Franke A. Quee, Henriëtte H. Weekamp, Dorine W. Swinkels, Věra M. J. Novotny, Hans L. Zaaijer, and Katja van den Hurk. “Ferritin-guided iron supplementation in whole blood donors: optimal dosage, donor response, return and efficacy (FORTE)-a randomised controlled trial protocol”. In: *BMJ open* 12.3 (Mar. 2022), e056316.

- [135] Amber Meulenbeld, Steven Ramondt, Maike G. Sweegers, Franke A. Quee, Femmeke J. Prinsze, Emiel O. Hoogendijk, Dorine W. Swinkels, and Katja van den Hurk. *Effectiveness of Ferritin-guided Donation Intervals in Blood Donors: results of the Stepped Wedge Cluster-randomised FIND'EM Trial*. Jan. 2023.
- [136] Ashish Vaswani, Noam Shazeer, Niki Parmar, Jakob Uszkoreit, Llion Jones, Aidan N. Gomez, Łukasz Kaiser, and Illia Polosukhin. *Attention Is All You Need*. Dec. 2017.
- [137] Lei Huang, Feng Mao, Kai Zhang, and Zhiheng Li. “Spatial-Temporal Convolutional Transformer Network for Multivariate Time Series Forecasting”. In: *Sensors* 22.3 (Jan. 2022), p. 841.

