

Pemodelan Prediksi Adverse Pregnancy Outcomes (APO) berbasis Machine Learning untuk Membangun Prototipe electronic Personal Health Record (ePHR) sebagai Upaya Peningkatan Kinerja Bidan Dalam Deteksi Dini di Fasilitas Kesehatan Tingkat Pertama (FKTP)

Santy, Eka

Deskripsi Lengkap: <https://lib.fkm.ui.ac.id/detail.jsp?id=138863&lokasi=lokal>

Abstrak

Latar Belakang: Adverse Pregnancy Outcomes (APO) diantaranya Berat Bayi Lahir rendah (BBLR), kelahiran preterm dan lahir mati merupakan penyebab utama kematian neonatal. Indonesia menduduki posisi tertinggi di ASEAN dan ke tujuh di dunia terkait kematian bayi baru lahir. Rumusan Masalah: Belum terdeteksi secara dini faktor risiko APO dengan cepat dan tepat di FKTP yang berdampak pada tingginya kematian bayi baru lahir, stunting dan kecerdasan yang rendah, sehingga perlu adanya pengembangan program pencegahan. Tujuan Penelitian: Menemukan model prediksi APO berbasis machine learning untuk pengembangan ePHR sebagai upaya deteksi dini di FKTP. Metode: Penelitian ini menggunakan Mixed Methods: Sequential Explanatory design melalui empat (4) tahap yaitu: (1) Studi Literatur; (2) Pembuatan model prediksi APO berbasis Machine Learning, (3) Membangun Prototipe ePHR Sebagai Deteksi Dini di FKTP dan (4) Uji penerimaan bidan dan Uji Efikasi terhadap penggunaan ePHR. Hasil: Ditemukan 22 Variabel penelitian dari 51 variabel yang dibutuhkan, ditemukan 3 indikator kritis dan 8 fitur esensial yang menjadi predictor utama kejadian APO diantaranya: Kesehatan ibu (komplikasi kehamilan dan atau persalinan, paritas lebih dari 4); Ketersediaan dan kualitas pelayanan (fasilitas pertolongan persalinan); Profile ibu (pendidikan rendah, status sosial ekonomi rendah, usia terlalu tua atau terlalu muda dan ibu bekerja). Analisis menunjukkan algoritma terbaik adalah random forest dengan target multiclass: AUC 98,4%; Sensitivity 95,1%; F1 Score 94,3%, Diimplementasikan kedalam prototipe ePHR 'e-bayiKusehAt' dengan 10 fitur untuk mendukung proses bisnis baru Deteksi dini APO terintegrasi dalam layanan antenatal di FKTP yang digunakan oleh bidan dan ibu hamil; Uji efikasi: Penggunaan Prototipe ePHR 'e-bayiKusehAt' meningkatkan kinerja bidan terutama deteksi dini terintegrasi dalam pelayanan Antenatal Diff-in-Diff tertinggi 1,571 ($p < 0,001$); Kemampuan prediksi APO Diff-in-Diff 0,079 ($p = 0,002$); Mempercepat keputusan rujukan Diff-in-Diff 0,324 ($p = 0,001$); dan pengetahuan bidan tentang faktor risiko APO Diff-in-Diff: 0,388 ($p = 0,031$); Ibu hamil meningkatkan Akses edukasi Diff-in-Diff: 1,680 ($p < 0,001$) dan Pengetahuan Tanda Bahaya: Diff-in-Diff: 1,443 ($p < 0,001$). Kesimpulan: Telah diperoleh suatu model untuk prediksi APO, yang didasari dari 22 variabel penting. Model tersebut digunakan untuk membangun prototipe e PHR 'e-bayiKusehAt', dimana hasil uji coba penggunaan prototipe berdampak pada peningkatan kinerja bidan dalam Deteksi Dini APO. Penggunaan prototipe ini ternyata juga efektif dalam meningkatkan kesadaran dan kesiapan ibu hamil terhadap potensi risiko kehamilan yang berdampak pada kejadian APO.

Background: Adverse Pregnancy Outcomes (APO) including low birth weight (LBW), preterm birth and stillbirth are the leading causes of neonatal mortality. Indonesia has the highest position in ASEAN and seventh in the world regarding newborn mortality. Problem Formulation: APO risk factors have not been detected early and quickly at primary health care facilities, which has an impact on high newborn mortality, stunting and low intelligence, so it is

necessary to develop a prevention program. Research Objective: Finding a machine learning-based APO prediction model for the development of ePHR as an effort to early detection in primary care. Methods: This research uses Mixed Methods: Sequential Explanatory design through four (4) stages, namely: (1) Literature Study; (2) Machine Learning-based APO prediction modeling, (3) Building ePHR Prototype as Early Detection in FKTP and (4) Midwife acceptance test and Efficacy Test for the use of ePHR. Results: 22 research variables were found from the 51 variables needed, 3 critical indicators and 8 essential features were found to be the main predictors of APO events including: Maternal health (complications of pregnancy and or childbirth, parity more than 4); Availability and quality of services (delivery assistance facilities); Maternal profile (low education, low socioeconomic status, too old or too young and working mothers). Analysis shows the best algorithm is random forest with multiclass target: AUC 98.4%; Sensitivity 95.1%; F1 Score 94.3%, Implemented into the ePHR prototype "e-bayiKusehAt" with 10 features to support new business processes Early detection of APO integrated in antenatal services at FKTP used by midwives and pregnant women; Efficacy test: The use of the ePHR Prototype "e-bayiKusehAt" improves midwives' performance, especially integrated early detection in antenatal services Diff-in-Diff highest 1.571 ($p < 0.001$); APO Diff-in-Diff prediction ability 0.079 ($p = 0.002$); Accelerating Diff-in-Diff referral decisions 0.324 ($p = 0.001$); and midwives' knowledge of APO Diff-in-Diff risk factors: 0.388 ($p = 0.031$); Pregnant women increase Diff-in-Diff education access: 1.680 ($p < 0.001$) and knowledge of danger signs: Diff-in-Diff: 1,443 ($p < 0,001$). Conclusion: A model for APO prediction was obtained, based on 22 important variables. The model was used to build the e PHR prototype "e-babyKusehAt", where the results of the trial use of the prototype had an impact on improving the performance of midwives in Early Detection of APO. The use of this prototype was also effective in increasing the awareness and readiness of pregnant women to potential pregnancy risks that have an impact on the incidence of APO.