

INTISARI

Peningkatan kesehatan ibu menjadi salah satu hal yang tengah diprioritaskan pemerintah Indonesia. Di antara upaya yang dapat meningkatkan kesehatan ibu adalah pemberian *maternity care* secara kontinu termasuk di dalamnya *postnatal care* atau layanan kesehatan pasca persalinan. Kunjungan *postnatal* khususnya pada pekan pertama setelah persalinan direkomendasikan untuk dilakukan di rumah. Sebagai upaya meningkatkan efisiensi kunjungan, pengoptimalan rute pun perlu diupayakan. Akan tetapi, studi *home health care routing* (HHCR) yang spesifik memodelkan pengoptimalan layanan *postnatal* masih sangat terbatas. Oleh karena itu, penelitian ini dilakukan untuk mengembangkan model optimasi HHCR sesuai karakteristik jadwal kunjungan *postnatal* di Indonesia.

Pada penelitian ini, model matematis dibangun dalam model *mixed integer programming* kemudian ditulis dalam program Python untuk diselesaikan dengan *solver* Gurobi. Verifikasi dilakukan dengan menyelesaikan *small* dan *medium instance* untuk memastikan model sudah dibangun dengan benar. Setelah itu validasi dilakukan dengan enumerasi. Setelah model terverifikasi dan valid, dilakukan *numerical experiment* dengan *large instance* dan analisis sensitivitas untuk mengetahui pengaruh perubahan parameter terhadap nilai fungsi objektif dan utilitas bidan.

Dari penelitian ini berhasil dikembangkan model *postnatal* HHCR dengan fungsi objektif meminimalkan total waktu tempuh rute kunjungan dalam rentang periode beberapa hari sesuai periode kunjungan *postnatal*. Pada model ini, kunjungan *postnatal* pertama dibatasi wajib dilakukan dalam rentang 3-7 hari setelah persalinan. Kemudian, kunjungan kedua dapat dilakukan seminggu pasca persalinan dengan mempertimbangkan *continuity of care* yakni memasang pasien pada bidan yang telah mengunjunginya sebelumnya. Selain itu, kunjungan juga dilakukan pada rentang *time window* penyedia *homecare* dan pasien. Berdasarkan uji verifikasi didapati bahwa tidak terdapat *constraint* yang terlanggar dan dari hasil uji validasi diperoleh bahwa solusi yang dihasilkan program sudah optimal. Selain itu dari hasil analisis sensitivitas dapat diketahui pengaruh perubahan parameter jumlah kunjungan, durasi kunjungan, rentang *time windows*, dan minimal jam kerja bidan terhadap waktu tempuh perjalanan dan utilitas bidan.

Keywords: model optimasi, kunjungan pascasalin di rumah, *home health care routing problem*, multiperiode, jendela waktu, *continuity of care*.

ABSTRACT

Improving the health of mothers is currently being prioritized by the Indonesian government. Among the efforts that can improve the health of mothers is to provide continuous maternity care which includes postnatal care. Postnatal visits, especially in the first week after delivery, are recommended to be carried out at home. As an effort to increase postnatal home visit efficiency, route optimization needs to be conducted. However, studies about home health care routing (HHCR) that specifically model the optimization of postnatal care are still very limited. Therefore, this research was conducted to develop an optimization model of the HHCR problem according to the characteristics of postnatal visit schedules in Indonesia.

In this study, the mathematical model was built in a mixed integer programming model and then written in a Python program to be solved by the Gurobi solver. Verification is carried out by running small and medium instances to ensure the model has been built correctly. Then, validation is carried out with enumeration. After the model is verified and validated, numerical experiment with large instance and sensitivity analyses were performed to identify the effect of parameter changes on the objective value and midwives' utility.

From this research, the postnatal HHCR model was successfully developed with the objective function of minimizing total travel time of the visit routes in multi-period according to postnatal care schedule. In this model, the first postnatal home visit is required to be carried out within 3-7 days after delivery. Then, a second visit can be made a week after delivery by considering the continuity of care that assign the patient to the midwife who has visited her before. In addition, the visits should be done during the time window of the homecare provider and patients. Based on the verification test, it was found that there was no constraint violated, and from the result of the validation test, it was found that the solution generated from the program was already optimum. In addition, based on the results of the sensitivity analyses of the model, the effect of the parameters change on the travel time and midwives' utility can be identified. The parameters that have been analysed are the number of visits, visit duration, time windows' span, and minimum worktime of the midwives.

Keywords: optimization model, postnatal home visit, home health care routing problem, multiperiod, time windows, continuity of care.