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**Vaccination of young children in Burkina Faso: Coverage, timeliness and out-of-sequence application.**

Promotionsfach: Public Health  
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The expanded programme of immunizations (EPI) started in the early 1980s in Burkina Faso. The EPI in Burkina Faso has set the goal to ensure complete and timely immunization for at least 80% of eligible children in the country. The performance of vaccination programs is typically measured in terms of the number of individuals having been vaccinated without regard to the exact age at which vaccine doses were administered. This method does not reveal the degree to which children experience delays prior to becoming immunized. Moreover, there is increasing evidence for non-specific effects of vaccines on childhood mortality, which may also depend on the timeliness and sequence of routine vaccinations.

This study describes the coverage, the timeliness and out-of-sequence vaccination among young children and discusses their implication for the non-specific effects of vaccines on child survival in the Health and Demographic Surveillance System (HDSS) area of Nouna in Burkina Faso. The HDSS area of the Nouna is located in the Nouna Health District in north-western Burkina Faso. It includes the town of Nouna and 58 surrounding villages and covers a subset of the district with a multi-ethnic population of about 78.000, estimated in 2007. It is a very poor population consisting mainly of subsistence farmers. The education level is very low with 80% of adult women being illiterate. Malaria is the main cause of morbidity and mortality particularly in young children, and access to health services is limited. Formal health services are provided through 15 village-based health centres and the district hospital in

Nouna town. The study region been characterized by vaccination coverage rates significantly below the national average.

The study used data of 11,906 children born between September 2003 and March 2009. The Data was collected from September 2008 to December 2009. Vaccination data were provided on the basis of events recorded on vaccination cards. Vaccination coverage, timeliness and frequency of out-of-sequence vaccination were estimated based mainly on data from available vaccination cards of the study children.

Single Vaccination coverage ranged from 80% (measles) to 94% (OPV1). Full vaccination coverage in children aged 12-23 months was around 75%, with a significantly higher coverage in rural compared to urban areas. There were no differences in vaccination coverage between boys and girls. The highest rates of timely administration were observed with vaccines recommended at birth (e.g. 68% for BCG) while the lowest rates were observed with vaccines given in late infancy (e.g. 33% for measles). The frequency of out-of-sequence vaccination between BCG and DTP/Penta 1 or between DTP/Penta 3 and measles were around 5% and 4% respectively. Out-of-sequence vaccination in early infancy occurred significantly more frequent in rural compared to urban areas contrary to out-of-sequence vaccination in late infancy. Both, timely and correct sequencing of vaccination have significantly improved in recent years in the study area.

The study supports other studies which found vaccination coverage improvement in Burkina Faso recently with slightly better vaccination coverage in rural compared to urban areas, which needs further consideration. Moreover, it supports that significant vaccination delay occurs in SSA communities with high vaccination coverage and that the frequency of out-of-sequence vaccinations varies substantially between countries.