We explore conditions under which matchings in the $d$-dimensional hypercube extend to perfect matchings. In a bipartite graph $G$, a set $S \subseteq V(G)$ is deficient if the vertices of $S$ together have fewer than $|S|$ neighbors. Let $M$ be a matching (with vertex set $U$) in the $d$-dimensional hypercube such that $Q_d - U$ has no deficient set of size less than $k$. If $|M| \leq k(d - k) + \binom{k-1}{2}$, then $M$ extends to a perfect matching. Furthermore, this result is sharp. (Received September 15, 2008)