The objective of the study was to develop a low cost supplementary formula using different neglected food parts. After extensive literature review jackfruit seeds, watermelon seeds, drumstick leaf powder and fish bone dust of Catla as neglected food parts and rice flakes, roasted bengal gram powder (sattu) as regular foodstuffs were used as starting ingredients to develop the formulae. All the ingredients were processed thoroughly using regular cooking methods to prepare powder. Jackfruit seeds were processed by dry heat (JS1) and moist heat treatments (JS2). Among 5 supplementary formulae (SF), SF-A, SF-B, and SF-C were developed by using only neglected food parts in different proportion whereas SF-D and SF-E were developed using 50% of neglected food stuffs along with 50% of selected regular food stuffs. The nutritive value of the formula was estimated by standard methods and found to be almost similar to each other. All the formulae were rich in protein, carbohydrate and calcium. The costs of the formulae were few times cheaper compared to other commercial supplementary formula. But evaluators did not like the colour and taste of SF-A and SF-B in the preliminary sensory evaluation, therefore these two formulae were excluded from further study. SF-C containing 65% of JS1 showed severe growth retardation in albino rats along with abnormality in liver function. Moderate growth without any abnormality in liver function was found in experimental rats offered SF-D which contained 22.5% of JS1. But SF-E containing 22.5% of JS2, imparted excellent growth, showed significantly higher haemoglobin level and cardio protective properties by lowering triglyceride and cholesterol level in treated rats. Considering the positive results obtained from SF-E, was taken for further research. SF-E was added in regular Indian cuisine during cooking. But the sensory attributes were unaltered in the prepared foods indicating well acceptance of the formula. No deterioration was found in sensory attributes of SF-E kept in ambient as well as refrigerated temperature for 6 months by estimating moisture percentage and by triangle test of sensory evaluation. Therefore it can be said that the newly developed formula can be very helpful for most Indians to fill the nutrition gap with least expense.