Hybrid lead halide perovskites with chemical formula of APbX3 for 3-dimensional structures, and A2PbX4 for 2-dimensional structures, where A= [CH3NH3 (MA), NH2CH2=NH2 (FA), C4H9NH3 (BA)], X= [Cl, Br, I], comprise a set of fully corner-sharing inorganic PbX6 octahedra and organic cations at the center for 3D perovskites and corner-sharing sheets of inorganic Pb-X octahedra partitioned by organic cations for 2D perovskites. These materials endow remarkable electronic and photovoltaic properties, exhibiting huge potential application in lasers, light-emitting diodes (LEDs), and solar cells. Exploration to such materials is still at early stage and full assessment of their structures and properties will no doubt further strengthen their understanding and potential applications. High pressure and variable temperature are clean and convenient tools for such investigation as they allow easy access to various structures and interactions among the constituent atoms and molecules. Therefore, we study the pressure and temperature effects on the structure distortion in the hybrid perovskite family, to address the inorganic PbX6 octahedra tilting and organic cations disorder-ordering, which significantly modify the physical and chemical properties for better utilization of hybrid perovskite materials.